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THE PLANT DISEASE REPORTER

Issued By

THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

AGRICULTURAL RESEARCH ADMINISTRATION

UNITED STATES DEPARTMENT OF AGRICULTURE

SUPPLEMENT 221

## DISTRIBUTION, SYMPTOMS AND CONTROL OF SOME OF THE MORE IMPORTANT PLANT DISEASES

Supplement 221 October 15, 1953

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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station Beltsville, Maryland

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FOREWORD

The following list was compiled by the Yearbook of Agriculture Committee, with the assistance of many other persons, for inclusion in the Department of Agriculture Yearbook, 1953. Circumstances prevented its publication in the Yearbook.

The compilation has value even though perhaps the popular style makes it somewhat simplified for pathologists. It has been carefully thought out and represents much work. I believe you will find it to be helpful in supplying informational reference material to non-pathologists.

Diseases and hosts are mostly those occurring in the United States. Banana and rubber are the main exceptions.

The compilation was not intended to be complete, but was planned as a selected list of the important, economic, plant diseases. P. R. M.

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DISEASES OF CEREAL CROPS

HOST Disease and Cause Distribution	Symptoms	Control
BARLEY:		
Bacterial blight, a bacterium, *Xanthomonas translucens* North America	Narrow, linear, translucent and glossy lesions on leaf blades and sheaths	Crop rotation and seed treatment.
Covered smut, a fungus, *Ustilago hordei* General with barley	Barley heads converted into hard, black, smutted masses enclosed within thin membranes.	Seed treatment and resistant varieties.
Ergot, a fungus, *Claviceps purpurea* Temperate, humid and semihumid areas.	A few to many kernels of a head are replaced by conspicuous blue-black sclerotial bodies.	Crop rotations and removal or cutting of weed grasses.
Fusarium blight or scab, fungi: *Gibberella zeae* and *Fusarium* spp. Temperate, humid and semihumid areas. Head blight phase occurs in humid Eastern and Central States. Seedling blight and root rot phase extends into drier prairie and plains areas.	Heads dwarfed and compressed; blighted kernels shrunken; seed hulls lusterless, often bear salmon-colored fungus; seedlings blighted; roots rotted.	Resistant varieties offer best means of control. Clean seed and seed treatment help control seedling infection. Sanitation, rotation, and early planting help reduce crown infection and head blight.
Leaf rust, a fungus, *Puccinia hordei* Humid and semihumid areas.	Light, yellowish-brown rust pustules on leaf blades and sheaths; ruptured host epidermis around pustule generally inconspicuous.	Resistant varieties.
Mosaic, wheat mosaic viruses that overseason in soil Coincident with the soil-borne wheat mosaic viruses where winter barley is grown.	Leaf mottling and stunting of plants.	Resistant varieties.
Net blotch, a fungus, *Pyrenophora teres* Temperate, humid and semihumid areas.	Leaves develop dark-brown stripes with a characteristic netted pattern.	Sanitation; crop rotation; seed treatment with standard mercury fungicides.
Nigra loose smut, a fungus, *Ustilago nigra* General with barley.	Powdery, smutted heads very similar to those of the nuda loose smut.	Seed treatment and resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
BARLEY cont.		
Nuda loose smut, a fungus, Ustilago nuda		
General in humid and semihumid areas.	Normal heads replaced with black masses of powdery smut.	Treatment of seed with hot water.
Powdery mildew, a fungus, Erysiphe graminis		
Severe throughout the humid and semihumid areas of the world.	Cottony white growth on leaf blades, leaf sheaths, and floral bracts.	Use of resistant varieties is only practical control.
Scald, a fungus, Rhynchosporium secalis		
Cooler humid and semihumid sections of North America.	Scaldlike blotches on leaf blades and sheaths.	Resistant varieties, crop rotation, and elimination of crop residue.
Spot blotch, a fungus, Helminthosporium sativum		
Widespread in North America.	Dark-brown blotches on leaves; kernels blackened at embryo end.	Resistant varieties, seed treatment with mercury compounds; sanitation and crop rotation.
Stem rust, a fungus, Puccinia graminis		
Throughout humid and semihumid temperate regions.	Reddish-brown rust pustules on leaves and stem; ruptured epidermis of the host surrounds pustule.	Resistant varieties and barberry eradication.
Stripe, a fungus, Helminthosporium gramineum		
World-wide.	Yellow stripes on leaf blades and sheaths which later turn brown; infected tissues dry out and fray as leaves mature; heads fail to emerge in many diseased plants; culm length reduced.	Resistant varieties and seed treatment with mercurial fungicides.
Stripe mosaic (false stripe), a seed-borne virus		
Probably general with barley culture.	Chlorotic stripes, brown stripes, mosaic mottling, stunting of plants.	Use of seed from disease-free fields.
Stripe rust, a fungus, Puccinia glumarum		
Limited to areas of relatively cool summer temperatures and humid winters.	Narrow stripes of yellow rust on leaf blades, leaf sheaths, and floral bracts.	Resistant varieties.
Yellow dwarf, a virus		
California	Yellowing of leaves, stunting of plants.	Control of aphids that transmit the virus; possibly resistant varieties.
CORN:		
Bacterial leaf blight (Stewart's), a bacterium, Bacterium stewarti		
Throughout Corn Belt; Eastern and Southern States.	Long, irregular streaks running along veins of leaves killing them in severe cases and appearing to fire plants from bottom upward.	Resistant hybrids and varieties.

HOST Disease and Cause Distribution	Symptoms	Control
CORN cont.		
Brown spot, a fungus, *Physoderma maydis*		
Gulf States and occasionally South Atlantic States.	Golden to brown, smooth pustules on leaves, stalks, and sheaths; black rot sometimes causing stalks to break.	None. (Differences in resistance to its attack exist.)
Cob rot, fungi: *Nigrospora sphaerica* and *N. oryzae*		
Variable; all corn-growing areas, especially northwestern sections of Corn Belt.	Bleached, dull, chaffy kernels on ears that can be easily pressed into cob; ear easily broken; inside cobs and shanks shredded; black spores scattered over butt end of ear and tips of kernels; on mildly affected ears only base or tip of cob chocolate brown.	Use of hybrids well adapted to area is recommended.
Common smut, a fungus, *Ustilago maydis*		
All-corn growing areas	Conspicuous silver-white glistening knobs on any above-ground parts of plant that break later to become masses of black, sooty spores.	Balanced soil fertility to maintain uniform growth; clean cultivation and removal of diseased plants from field.
Crazy top, a fungus, *Sclerospora macrospora*		
Sporadically in southern Corn Belt.	Bunchy appearance of tassel due to replacement by numerous small leaves; stunting of plant; excessive tillering; narrow streaked leaves; barrenness.	None. Drainage of lower parts of fields recommended.
Dry or white ear rot		
A fungus, *Diplodia zeae*		
All principal corn areas, especially Eastern and Southeastern States, during warm, wet seasons.	Bleached husks and dropping of ears near soft-dough stage; rotting of shank; ear rot usually beginning at base and appearing grayish brown; kernels dried and cemented together, covered with white to gray growth; in light infections kernels only blackened at tip.	Resistant hybrids and varieties (no resistance is complete); rotation.
A fungus, *Diplodia macrospora*		
Southern States	Same as above; also spots on leaves.	Resistant hybrids and varieties (no resistance is complete); rotation.
Gray ear rot, a fungus, *Physalospora zeae*		
Corn Belt	Tightly cemented bleached husks, upright and gray at harvest; grayish-white mold between kernels at butt end of ear; pith slate gray with scattered black specks; kernels gray or with black streaks or flecks.	Resistant hybrids or varieties.

HOST Disease and Cause Distribution	Symptoms	Control
CORN cont.		
Head smut, a fungus, Sphacelotheca reiliana		
Pacific Coast States and scattered localities in Southwestern States.	Smut galls or knobs on tassels and ears of plant breaking into loose dark-brown spore masses.	Avoid planting in smutted field for 2 years; use treated certified seed; resistant hybrids and varieties.
Helminthosporium leaf spot, a fungus, Helminthosporium carbonum, race I.		
Corn Belt, on only a few strains of corn.	Small, tan to brownish spots with zonate pattern on all parts of plant, spots generally circular or oval and covered with black spores, especially on sheaths; also sometimes blackened ears.	Resistant hybrids or varieties.
Mosaic, sugarcane mosaic virus		
Central Gulf region, especially sugarcane-growing States.	Mosaic mottling of leaves or striping of light green surrounded by normal green tissue; suckering to a slight degree.	Tolerant hybrids or varieties; control of aphids that transmit virus.
Northern leaf blight, a fungus, Helminthosporium turcicum		
All corn-growing areas.	Long, elliptical greenish-brown spots on leaves beginning at bottom of plant and diminishing upwards; may destroy entire leaves making plants appear fired.	Resistant hybrids or varieties.
Pink ear rot, a fungus, Gibberella fujikuroi (Fusarium moniliforme)		
Corn Belt, especially western parts where dry weather prevails during growing season.	Pink, powdery rot scattered in spots, especially at tips of ears, appearing after kernels are dented, usually following injuries or exposure.	Resistant hybrids or varieties.
Red ear rot, a fungus, Gibberella zeae		
Corn Belt, particularly northern part; other corn-growing areas.	Ear rot usually beginning at tip, with reddish color to kernels and husks, sometimes cemented together.	Resistant hybrids and varieties; clean plowing to bury old stalks; rotation.
Rhizoctonia ear rot, a fungus, Rhizoctonia zeae		
Florida and neighboring States.	In early stages, ear covered with pink mold, later turns gray; tightly cemented husks.	None.
Root rots, fungi: Pythium arrhenomanes, Gibberella zeae, G. fujikuroi, Diplodia zeae		
Variable; over Corn Belt and southern corn areas.	Rotting of embryo and secondary rootlets; stunting of plants; reduction in vigor; premature death; lodging.	Crop rotation with plants immune from root-rotting fungi such as legumes; use of resistant hybrids and varieties.

HOST Disease and Cause Distribution	Symptoms	Control
CORN cont.		
Rust, a fungus, *Puccinia sorghi*		
All corn-growing areas	On leaves, small, reddish-brown pustules that break through surface and scatter powdery spores; near end of season pustules turn black.	None. (Differences in resistance to it by hybrids and varieties.)
Seedling blights, fungi: *Aspergillus* sp., *Penicillium* sp., *Pythium arrhenomanes*, *Diplodia zeae*, *Gibberella zeae*, *Nigrospora oryzae*, *Fusarium moniliforme*.		
Variable, depends on climate; throughout all corn-growing areas.	Failure of plant to emerge; blighting off after emergence; yellowing and wilting of leaves.	Use of sound, mature, treated seed; planting in warm soil; resistant hybrids or varieties.
Southern leaf blight, a fungus, *Cochliobolus heterostrophus* (*Helminthosporium maydis*)		
Southern Corn Belt and Southern States.	Small, buff to reddish brown, generally angular spots with zonate pattern on leaves; leaves may appear fired.	Resistant hybrids or varieties.
Stalk rots		
A fungus, *Diplodia zeae*		
Corn Belt, wherever corn is grown.	Maturing plants wilt while green; lower stalk darker; pith destroyed; stalks break over.	Use of resistant hybrids and varieties well adapted to area; balanced soil fertility.
A fungus, *Gibberella zeae*		
Northern Corn Belt and Northeastern States.	Rotting of crown or lower internodes; pinkish, shredded inner stalk.	Resistant hybrids and varieties; clean plowing to turn under residue; crop rotation.
A fungus, *Pythium aphanidermatum* (*P. butleri*).		
Corn areas in southern and eastern coastal States, and Southern Corn Belt.	Brown and soft rotting of stalks near ground sometimes twisting and falling over; follows high humidity and temperature.	None; rotations recommended.
Stalk rots, bacterial		
A bacterium, *Erwinia dissolvens*		
Southern Corn Belt and Southern States.	Brown, discolored soft area near base of stalk; pungent odor.	None; rotations recommended.
A bacterium, *Pseudomonas alboprecipitans*		
Southern Corn Belt and Southern States.	Dark-brown to black rot of nodes and internodes just above ear node; outer stalk with brownish-red streaks; inner stalk black but without pungent odor.	None.

HOST Disease and Cause Distribution	Symptoms	Control
CORN cont.		
Stunt, a virus		
California, Texas	Chlorotic spotting and streaking, banding to yellowing and bleaching of leaves; tassels deformed; some red in leaves and stalks; axillary proliferations; stunting.	Early planting to avoid leafhoppers that transmit virus.
FLAX		
Browning and stem break, a fungus, Polyspora lini		
General	Light-gray to brown, circular lesions on cotyledons lead to cankers on cotyledonary node and break-over of stem.	Seed treatment or use of disease-free seed; resistant varieties.
Fusarium wilt, a fungus, Fusarium oxysporum f. lini		
General with flax culture.	Yellow leaves, thick apical leaves, plants die and turn light brown.	Resistant varieties.
Heat canker, physiological		
Semihumid areas of high altitude and intense sunlight.	Heat near soil line kills cortical tissue and forms cankers that girdle stem; stem breaks over; invading organisms aggravate injury.	Early sowing; higher seeding rates; rows running east to west; sowing of flax-grain mixtures to produce more shade.
Pasmo, a fungus, Mycosphaerella linorum		
General.	Lesions on cotyledons and then on lower leaves; lesions are circular, greenish yellow to brown; later pycnidia develop on them.	Seed treatment; sanitation; deep plowing to cover straw; resistant varieties.
Powdery mildew, a fungus, Erysiphe cichoracearum		
North Central States; rare.	Superficial gray mycelium on leaves, stems, and floral structures.	Not serious enough to require control.
Rust, a fungus, Melampsora lini		
General with flax culture.	Light to orange-yellow aecia and pycnia on leaves and stems early in growing season; later uredia and uredospores appear, and then telia and teliospores form to overwinter the fungus.	Crop rotation; plowing under all crop refuse; thorough cleaning of seed to remove infected leaf particles; resistant varieties.
Seedling blight and root rot, a fungus, Pythium sp.		
Coexistent with flax.	Weak, dwarfed seedlings; lower leaves turn brown; soft brown rot of root.	Crop rotation and proper seed treatment.
OATS		
Apical and eyespot mosaic, soil-borne viruses		
North and South Carolina, Georgia, Alabama	Green to yellow mottling and eyespots on foliage; some stunting.	Resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
OATS cont.		
Bacterial stripe blight, a bacterium, *Pseudomonas striafaciens*		
General.	Sunken water-soaked spots coalesced into stripes; bacterial exudate on leaves.	Crop rotation; seed treatment; resistant varieties.
Covered smut, a fungus, *Ustilago kolleri*		
General.	Smut replaces kernels within glumes.	Seed treatment and resistant varieties.
Crown rust, a fungus, *Puccinia coronata*		
General.	Orange-yellow uredia on leaves and stems; later dark telia.	Resistant varieties; eradication of *Rhamnus* spp.
Halo blight, a bacterium, *Pseudomonas coronafaciens*		
General in humid areas.	Small, green to light-brown, water-soaked lesions on leaves, sheaths, and floral bracts.	Seed treatment; sanitation; rotation.
Helminthosporium leaf blotch, a fungus, *Pyrenophora avenae* (*Helminthosporium avenae*).		
General.	Reddish-brown, oblong to linear leaf blotches with sunken centers and abundant conidia.	Resistant varieties.
Leaf reddening, barley yellow dwarf virus		
California.	Reddening and chlorosis of foliage; stunting.	Aphid control; resistant varieties.
Loose smut, a fungus, *Ustilago avenae*		
General.	Naked smut without glumes replaces kernels.	Seed treatment and resistant varieties.
Powdery mildew, a fungus, *Erysiphe graminis avenae*		
General.	Light-gray mold on leaves.	Resistant varieties.
Scab or fusarium blight, fungi: *Fusarium* and *Gibberella* spp.		
General.	Straw-colored blighted kernels with pinkish mass of mycelium and spores.	Rotation and resistant varieties.
Stem rust, a fungus, *Puccinia graminis avenae*		
General.	Reddish-brown spores in pustules on stem and leaves; later black teliospores.	Resistant varieties and barberry eradication.
RICE		
Black sheath rot, a fungus, *Ophiobolus oryzinus*		
Arkansas, Louisiana, Texas	Sheaths rot at water line in July-August.	None described.
Blast, a fungus, *Piricularia oryzae*		
General except California.	Dark spots on leaves and stems; stalks or heads break over.	Flooding of fields when spots appear; resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
RICE cont.		
Bordered sheath spot, a fungus, *Rhizoctonia oryzae*, *R. solani*, and *R. zeae* Louisiana, Texas, Arkansas, Colorado	Spots on sheath above water line, brown margins and cream color.	Fertility balance to prevent excessive vegetative growth.
Brown spot and rotten neck, a fungus, *Helminthosporium oryzae* Southern U. S.	Reddish-brown leaf spots, dried leaves, brown glumes, broken-over heads.	Seed treatment; resistant varieties.
Cercospora or narrow brown leaf spot, a fungus, *Cercospora oryzae* Arkansas, Louisiana, Texas.	Narrow brown spots on leaves in August and September.	Resistant varieties.
Kernel smut, a fungus, *Neovossia horrida* Arkansas, Louisiana, Texas.	A few smutted kernels on some heads.	None described.
Leaf smut, a fungus, *Entyloma oryzae* Arkansas, Louisiana, Texas.	Small black spots on leaves.	None described.
Root knot, a nematode, *Meloidogyne* sp. (*Heterodera marioni*) Arkansas.	Swollen roots; dwarfed yellow plants.	Rotation with immune crops.
Seedling blight, fungi: *Sclerotium rolfsii*, *Helminthosporium oryzae*, *Curvularia lunata* Gulf States rice area.	Poor emergence; seedlings diseased at soil surface, many killed.	Seed treatment; immediate submergence of land when blight appears.
Stem rot, fungi: *Leptosphaeria salvinii*, *Helminthosporium sigmoideum irregulare* Chiefly Arkansas and Louisiana; some in California and Texas.	Lesions on leaf sheaths near water line with black sclerotia on sheaths and stalks; heads break over.	Drainage of fields before culms are infected.
Straighthead, physiological Southern U. S.	Unfilled erect heads; dark-green leaves; poor root system.	Midseason drainage; proper soil management; rotation.
White tip, a nematode, *Aphelenchoides oryzae* General	Colorless leaf tips; distorted, sterile panicles.	Seed fumigation with methyl bromide to kill nematodes..
RYE		
Anthracnose, a fungus, *Colletotrichum graminicola* North Central States	Premature ripening or dying; bleaching then browning of culm bases and crown tissue; black acervuli on leaves and stems.	Crop rotation with legumes; improved soil fertility.

HOST Disease and Cause Distribution	Symptoms	Control
RYE cont.		
Bacterial blight, a bacterium, *Xanthomonas translucens* f. *secalis* General.	Water-soaked lesions on leaves, with bacterial exudate present.	Rotation; seed treatment; resistant selections.
Ergot, a fungus, *Claviceps purpurea* General.	Dark sclerotia in place of some kernels.	Crop rotation; destruction of grass hosts.
Fusarium blight or scab, fungi: *Gibberella* and *Fusarium* spp. Humid and semihumid rye areas.	Seedling blight, foot rot, and head blight.	Rotation; sanitation; seed treatment.
Leaf blotch, a fungus, *Septoria secalis* General.	Light-brown blotches with pycnidia.	Rotation; sanitation; seed treatment.
Leaf rust, a fungus, *Puccinia rubigo-vera secalis* General.	Orange-brown uredia on leaves and sheaths; telia beneath epidermis.	Resistant varieties; dusting.
Leaf scald, a fungus, *Rhynchosporium secalis* General.	Water-soaked, irregular, scaldlike blotches on leaves.	Rotation; spring burning of perennial grass hosts.
Nematode disease, a nematode, *Anguina tritici* Southeast U. S.	Small, hard, tan galls replace kernels.	Rotation with crops other than wheat; use of gall-free seed.
Septoria leaf blotch, a fungus, *Septoria secalis* General.	Brown pycnidia on leaf blotches.	Seed treatment; sanitation.
Snow mold, foot rot, and head blight, a fungus, *Calonectria graminicola* Northern wheat areas of U. S.	Crown rot, head blight, shriveled kernels.	Good drainage; rotation.
Stalk smut, a fungus, *Urocystis occulta* General.	Sori in parenchyma of stem beneath epidermis, which ruptures to release spores.	Seed treatment; rotation; resistant varieties.
Stem rust, a fungus, *Puccinia graminis secalis* General.	Pustules of red uredospores on stems and sheaths; later black overwintering teliospores.	Barberry eradication; dusting; resistant varieties; eradication of grass hosts.
Stripe rust, a fungus, *Puccinia glumarum* Pacific and intermountain areas.	Orange-yellow pustules uniting to form stripes on leaves.	Resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
SORGHUM		
Anthracnose, a fungus, *Colletotrichum graminicola* Humid and semihumid areas.	Small spots, tan to reddish, enlarge to cover much of leaves; black pinpoint fruiting bodies among short hairs.	Clean culture and rotation, but chiefly resistant varieties.
Bacterial spot, a bacterium, *Pseudomonas syringae* Southeast U. S.	Dark-green spots turning to red, then light in center with red border.	Sanitation, seed treatment, and resistant varieties.
Bacterial streak, a bacterium, *Xanthomonas holcicola* General.	Narrow, water-soaked, translucent streaks with red-brown margins and beads of exudate.	Sanitation, seed treatment, and resistant varieties.
Bacterial stripe, a bacterium, *Pseudomonas andropogoni* General.	Irregular red stripes with exudate; scales on leaves.	Sanitation, seed treatment, and resistant varieties.
Charcoal rot, a fungus, *Macrophomina phaseoli* (*Sclerotium bataticola*) General.	Near maturity, premature ripening, inferior heads lightweight kernels, lodging, soft base with shredded interior, and black sclerotia on vascular strands.	Development of resistant varieties.
Colletotrichum stalk rot, a fungus, *Colletotrichum graminicola* Humid and semihumid areas.	Leaf stage usually precedes stalk rot; poor heads; stalks rot inside and break over.	Clean culture, rotation, and resistant varieties.
Covered kernel smut, a fungus, *Sphacelotheca sorghi* General.	Kernels replaced by smut galls.	Seed treatment and resistant varieties.
Fusarium stalk rot, a fungus, *Gibberella fujikuroi* (*Fusarium moniliforme*) General.	Similar to charcoal rot externally, but internally red to dark rot and no shredding or sclerotia.	Development of resistant varieties.
Gray leaf spot, a fungus, *Cercospora sorghi* Gulf States.	Long, narrow, reddish-purple or tan leaf spots.	Development of resistant varieties or strains.
Head smut, a fungus, *Sphacelotheca reiliana* Sporadic.	Head replaced by black spore mass.	Sanitation and resistant varieties.
Leaf blight, a fungus, *Helminthosporium turcicum* Humid and semihumid areas.	Can cause seed rot and seedling blight; on leaves reddish to tan spots merge to kill leaves; spores form in center.	Resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
SORGHUM cont.		
Loose kernel smut, a fungus, *Sphacelotheca cruenta*		
General.	Stunting, excessive branching, and loose smut in heads.	Seed treatment and resistant varieties.
Periconia root rot, a fungus, *Periconia circinata*		
Southwest.	Stunting, yellowing of leaves, and premature death of plant.	Resistant varieties.
Rhizoctonia stalk rot, a fungus, *Rhizoctonia solani*		
Texas	Reddish pith, large brown sclerotia under leaf sheaths.	Clean culture, rotation, and resistant varieties.
Rough spot, a fungus, *Ascochyta sorghina*		
Southeast U. S.	Circular to oblong spots turning red or tan; tiny black pycnidia developing in spots.	Rotation and resistant varieties.
Rust, a fungus, *Puccinia purpurea*		
General.	Fruiting pustules with brown spores on leaves.	Resistant varieties.
Seed rot and seedling blight, fungi: species of *Fusarium*, *Aspergillus*, *Penicillium*, *Rhizoctonia*, etc.		
General.	Seed rot, damping-off, blighted seedlings, weak plants.	Seed selection and treatment; planting in warm, well-prepared soil.
Sooty stripe, a fungus, *Ramulispora sorghi*		
General.	Long, elliptical lesions with black sclerotia in tan center.	Development of resistant varieties or strains.
Target spot, a fungus, *Helminthosporium sorghicola*		
Southeast and Southern U. S.	Leaf lesions with light centers and alternate light and dark bands.	Development of resistant varieties or strains.
Weak neck, physiological		
General.	Early-maturing peduncle weakens and head breaks over.	Breeding for stronger peduncles.
Zonate leaf spot, a fungus, *Gloeocercospora sorghi*		
Southeast U. S.	Reddish-purple bands alternating with tan areas on leaf margin.	Seed treatment and resistant strains.
SWEET CORN:		
Bacterial wilt (Stewart's disease), a bacterium, *Bacterium stewarti*		
All corn-growing areas.	Young plants wilt as if lacking water; green leaves wilt and die, others become stunted with irregular streaks, produce nubbins or no ears; stalk will ooze yellow droplets if cut crosswise.	Resistant hybrids and varieties.

For other diseases see under corn.

HOST Disease and Cause Distribution	Symptoms	Control
WHEAT:		
Brown root rots, fungi: *Gibberella zeae* (*Fusarium graminearum*), *Fusarium* spp.		
General, especially in humid and semihumid areas.	Light to reddish-brown soft rot of roots and culms; seedling blight.	Seed cleaning and treatment; crop rotation; deep plowing of residues; balanced soil fertility.
Bunt or stinking smut, fungi: *Tilletia caries* and *T. foetida*		
Generally coexistent with wheat.	Smut balls replace kernels; fishy odor; *T. caries* stunts plants.	Seed treatment and resistant varieties.
Dry-land crown and root rot, fungi: *Helminthosporium sativum* and other species		
General.	Dark rot of roots, sheaths, culms, and crown tissue; seedling blight; leaf lesions; "black point" in seed.	Crop rotation; seed treatment; late fall seeding.
Dwarfing and greening, yellow dwarf virus		
California	Dwarfing and deep-green color.	Resistant varieties and aphid control.
Ergot, a fungus, *Claviceps purpurea*		
Humid areas	Dark sclerotia replace some kernels.	Rotation; elimination of grass hosts.
Leaf rust, a fungus, *Puccinia rubigo-vera tritici*		
General; severe in humid areas.	Uredospores on leaves; if severe, plants are killed.	Resistant varieties.
Loose smut, a fungus, *Ustilago tritici*		
General.	Black, loose smut mass, replaces kernels.	Hot-water seed treatment; resistant varieties.
Mosaic and rosette, soil-borne viruses		
Eastern U. S.	Leaf mottling and plant dwarfing.	Resistant varieties.
Nematode disease, a nematode, *Anguina tritici*		
Southeast U. S.	Plants stunted; leaves twisted and curled; hard dark galls replace kernels.	Rotations; use of seed free from galls.
Pythium root rot, fungi: *Pythium* spp., especially *P. arrhenomanes*		
General, especially in prairie soils.	Light-brown soft rot of roots, sheaths, and stalk; stunting; seedling blight; pale-green color.	Inadequate; rotation with legumes; balanced soil fertility.
Rhizoctonia blight, a fungus, *Rhizoctonia solani*		
General.	Stunting; rot of roots, crown, sheaths, and culms.	Rotation and balanced soil fertility.
Scab, a fungus, *Gibberealla zeae* (*Fusarium graminearum*)		
General, especially in humid areas.	Head blight, with salmon-colored fungus; also foot rot and seedling blight.	Crop rotation; sanitation; seed treatment; resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
WHEAT cont.		
Stem rust, a fungus, *Puccinia graminis tritici*		
Generally, coexistent with wheat.	Red uredospores on stems; later, black teliospores for overwintering.	Resistant varieties; barberry eradication.
Straw-breaker foot rot, fungi: *Cercosporella herpotrichoides*		
Columbia basin prairie soils.	Eyespot lesions; blackening and breaking of culms; lodging.	Rotation with legumes; light late seeding good soil preparation.
Streak mosaic, a virus		
Central U. S.	Dwarfing and leaf mottling.	None developed.
Striate mosaic, a virus		
South Dakota, Nebraska, Kansas	Dwarfing and leaf mottling.	None developed.
Stripe rust, a fungus, *Puccinia glumarum*		
Western U. S.	Orange-yellow pustules on stripes on leaves.	Resistant varieties.
Take-all, a fungus, *Ophiobolus graminis*		
General, but especially Kansas and Pacific Northwest.	Rotting and darkening of roots and crown; bleaching of leaves, culms, and heads.	Rotation with corn, oats, and legumes. Keep up level of potassium and phosphorus fertility.

DISEASES OF FIBER CROPS

HOST Disease and Cause Distribution	Symptoms	Control
COTTON:		
Anthracnose, a fungus, *Glomerella gossypii*		
Primarily in the Southeast but extends into Texas and Oklahoma.	Seedling blight, leaf spots, stem cankers and boll rots.	Destruction of diseased plant residues; rotation; and seed treatment.
Bacterial blight, a bacterium, *Xanthomonas malvacearum*		
Throughout the area where cotton is grown.	Water-soaked spots on cotyledons, leaves, and bolls; vein blight; cankers on stalk.	Destruction of diseased plant residues, use of resistant varieties, and seed treatment.
Boll rots, a large number of parasitic and saprophytic fungi and bacteria.		
Throughout the area where cotton is grown.	Sunken spots on surface and staining or destruction of interior of bolls.	Seed treatment and use of bacterial blight resistant varieties.
Fusarium wilt, a fungus, *Fusarium oxysporum* f. *vasinfectum*		
Primarily in the Southeast but extends into Texas and Oklahoma.	Stunting of plants; yellowing and wilting of leaves often followed by death of entire plant; brown to black discoloration of woody portion of stalk.	Use of resistant varieties, fumigation to reduce root knot and other nematodes, addition of humus to soil, use of fertilizers high in potash, crop rotations.
Root knot, nematodes or microscopic eelworms, *Meloidogyne incognita*		
Throughout the area where cotton is grown but principally on the lighter soils.	Loss of vigor, stunting or death of plants; roots covered with knots or galls at points of infection.	Fumigation with locally recommended soil fumigant; rotation with immune crops, clean fallow with deep summer tillage.
Root rot, a fungus, *Phymatotrichum omnivorum*		
In the highly calcareous soils of the Southwest.	Slight bronzing of leaves followed by sudden wilting and death of plants.	Fall plowing with phosphate additions and Hubam clover as winter cover crop or seed crop; rotation with grain crops or Hubam clover; heavy applications of organic manures in irrigated areas.
Damping-off and seedling diseases, complex of seed and soil-borne fungi and bacteria		
Throughout the area where cotton is grown.	Rotting of seed before germination, death of seedling before and after emergence, unthrifty seedlings and skippy stands.	Seed treatment, destruction of diseased plant residues, and use of blight-resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
COTTON cont.		
Root rot, a fungus, *Sclerotium rolfsii*		
Certain areas of Florida and Cuba.	Rotting of roots and base of plant with shredding of bark.	Avoid planting in infested areas.
Verticillium wilt, a fungus, *Verticillium albo-atrum*		
Throughout the Cotton Belt but primarily in the Mississippi Valley and the irrigated Southwest.	Stunting of plants; yellowish areas between principal veins and at margins of leaves; shedding of leaves, squares, and young bolls; brownish streaks in woody portion of plant.	Use of tolerant varieties; rotation with grain crops; use of cantaloup-type beds or extra high ridges to increase soil temperature; increase of plant populations. In irrigated areas avoid moisture stress after fruiting begins.
Ascochyta, or wet-weather, blight, a fungus, *Asoschyta gossypii*		
Principally in the Southeastern States.	Reddish-brown spots on leaves; brownish, elongate cankers on stem; generally unthrifty growth.	Destruction of diseased plant residues, seed treatment, early control of insects.
FLAX. See Flax in table on diseases of cereal crops.		
KENAF:		
Colletotrichum tip blight, a fungus, *Colletotrichum hibisci*		
Florida and Cuba.	Seedling blight tip blight and witches'-broom of older plants.	Seed treatment and use of resistant varieties or selections.
Root knot, nematodes or microscopic eelworms, *Meloidogyne incognita*		
Florida and Cuba in old cultivated areas and on lighter soils following truck crops.	Knots or galls on roots, stunted or dying plants.	Fumigation with soil fumigants such as Shell D-D or Dowfume W-40 or W-85.

DISEASES OF ORNAMENTALS

HOST Disease and Cause Distribution	Symptoms	Control
AZALEA:		
Petal blight, a fungus, *Ovulinia azaleae*		
Maryland to Texas, California.	Brown spots on white flowers, white spots on colored flowers, extending to soft limp blight of whole blossom.	Frequent spraying during season of bloom.
CALLA LILY:		
Soft rot, a bacterium, *Erwinia carotovora*		
General.	Soft decay of rhizomes and bases of leaves and flower stalks.	Sorting and treatment of rhizomes.
Root rot, a fungus, *Phytophthora richardiae*		
General in greenhouses.	Rotting of roots, yellowing and drooping of leaves, spongy rot of rhizomes.	Sorting and treatment of rhizomes; soil treatment.
CAMELLIA:		
Dieback, a fungus, *Glomerella cingulata*		
Widespread.	Dieback and blackening of young shoots, cankers on older branches.	Pruning and spraying have possible value.
Flower blight, a fungus, *Sclerotinia camelliae*		
California, Georgia, Oregon, North Carolina.	Brown spots on petals expanding to brown blight of entire flower.	Ground sprays or destruction of fallen flowers.
Leaf gall, a fungus, *Exobasidium camelliae*		
Southeastern States.	Diseased leaves much enlarged and thickened, white below.	Picking and destruction of galls; sprays if necessary.
CARNATION:		
Bacterial wilt, a bacterium, *Pseudomonas caryophylli*		
General in greenhouses.	Grayish green leaves; wilting; root rot; yellow streaks in conductive tissues, diseased tissues sticky.	Use of cultured cuttings or cuttings from disease-free stock; soil treatment.
Collar blight, a fungus, *Alternaria dianthi*		
General.	Leaf spots, stem and branch rot; affected areas dark brown to black with fungus growth.	Sprays for outdoor plants or keep plants in greenhouse.
Fusarium wilt, a fungus, *Fusarium oxysporum* f. *dianthi*		
General.	Slow wilting, often in one side of plant; straw-yellow leaves; brown streaks in conductive tissue.	Use of cultured cuttings or cuttings from disease-free stock; soil treatment.
Stem rot, a fungus, *Rhizoctonia solani*		
General.	Soft moist decay of stem surface near soil line; wilting.	Shallow planting; soil treatment.

HOST Disease and Cause Distribution	Symptoms	Control
CARNATION cont.		
Rust, a fungus, *Uromyces caryophyllinus* General.	Chocolate-brown pustules in leaves and stems.	Avoid wetting leaves; spray.
CHINA ASTER:		
Wilt, a fungus, *Fusarium oxysporum* f. *callistephi* General.	Wilting; blackening of stem near soil line; browning of conductive tissue.	Resistant varieties or seed and soil treatment.
Yellows, a virus General.	Yellowing; many lateral shoots with upright growth; flowers bleached or green.	Use of cloth enclosures; insecticidal sprays help.
CHRYSANTHEMUM:		
Leaf spot, a fungus, *Septoria chrysanthemi* General in gardens.	Yellowish spots becoming brown to black with minute black dots near the centers.	Mulch around plants helps; sprays.
Leaf nematode, a nematode, *Aphelenchoides ritzema-bosi* Widespread in gardens.	Yellowish spots becoming brown to black, often delimited by veins to form wedge-shaped areas; leaves finally wither and droop.	Use of disease-free plants; soil treatment; sprays.
Wilt, a fungus, *Verticillium albo-atrum* General.	Leaves yellow then brown; sometimes dark streaks in conductive tissues of affected stems.	Use of disease-free plants; soil treatment; some varieties resistant.
Stunt, a virus General.	Plants small with small leaves and flowers; bronze and pink flowers become paler or yellow.	Use of disease-free plants. Avoid handling diseased and healthy plants in turn.
DAHLIA:		
Mosaic, a virus General.	Yellowing along leaf veins, mottling, marked stunting in some varieties.	Roguing and control of aphids or use of tolerant varieties.
GLADIOLUS:		
Fusarium rot, a fungus, *Fusarium oxysporum* f. *gladioli* General in warmer soils and climate.	Leaves yellow then brown; firm brown decay of corms in field or storage.	Sorting and treatment of corms; rotation.
Dry rot, a fungus, *Stromatinia gladioli* General in cooler soils and climate.	Neck rot with black dots in rotted area; dark-brown to black firm decay of corms, margins raised.	Sorting and treatment of corms; rapid curing after harvest; rotation.

HOST Disease and Cause Distribution	Symptoms	Control
GLADIOLUS cont.		
Botrytis blight, a fungus, *Botrytis gladiolorum*		
General in cooler soils and climate.	Brown blight and rot of leaves, stems, and flowers with gray mold in cool wet weather; neck rot; firm brown rot of corms in storage.	Sorting and treatment of corms; rapid curing after harvest; sprays to control leaf and flower blight.
Scab, a bacterium, *Pseudomonas marginata*		
General.	Neck rot; shallow horny circular lesions on corms that lift out easily; brown streaks in husks.	Sorting and treatment of corms; rotation.
Curvularia blight, a fungus, *Curvularia lunata*		
General, chiefly in warmer areas.	Tan-colored elliptical leaf spots with darker margins; flower blight; firm brown corm rot.	Sorting and treatment of corms; sprays.
Stemphylium leaf spot, a fungus, *Stemphylium* sp.		
General.	Red leaf spots. Some strains cause extensive leaf rot.	Sprays.
HOLLYHOCK:		
Rust, a fungus, *Puccinia malvacearum*		
General.	Orange to reddish pustules on lower leaf surfaces and stems; leaves wither and droop if heavily rusted.	Removal of infected parts in fall and in early spring; sprays.
IRIS:		
Soft rot, a bacterium, *Erwinia carotovora*		
General.	Rapid wet rot of rhizomes and leaf bases; wound pathogen often following iris borer.	Cut out rotted areas, treat, dry and replant every 3 or 4 years.
Leaf spot, a fungus, *Didymellina macrospora*		
General.	Light brown leaf spots with dark brown borders.	Removal of infected parts in fall; sprays.
Southern blight, a fungus, *Sclerotium rolfsii*		
Widespread in warm soils.	Crown rot of iris and many other plants with strands of mycelium and sclerotia resembling mustard seeds.	Removal of infected plants; soil treatment.
LILAC:		
Bacterial blight, a bacterium, *Pseudomonas syringae*		
Widespread.	Brown to black water-soaked spots in leaves and soft young shoots extending rapidly in cool wet weather.	Pruning to remove infected parts and improve air circulation.
Phytophthora blight, a fungus, *Phytophthora cactorum*		
Northeast, Middle West.	Brown blight of blossoms and soft young shoots in cool wet weather.	Pruning, sprays. Keep lilac and rhododendron apart.

HOST Disease and Cause Distribution	Symptoms	Control
LILAC cont.		
Mildew, a fungus, *Microsphaera alni* General.	Leaves, coated with white mycelium chiefly in late summer and fall.	Sprays or dusts. Syringe with hose.
LILY:		
Botrytis blight, a fungus, *Botrytis elliptica* General.	Small oval leaf spots to extensive blighting of leaves and flowers in susceptible species in moist weather.	Removal of infected parts; sprays.
Fusarium rot, a fungus, *Fusarium oxysporum* f. *lilii* General.	Brown rot separating bulb scales from the base, destroying bulbs of Madonna, Easter lilies, and others.	Sorting and treatment of bulbs; soil treatment.
Necrotic fleck, a virus complex General in Easter lily.	Pale to brown flecks in leaves with distortion of leaf surface; dwarfing; thin streaks in flowers.	Planting of disease-free stock at a distance from diseased lilies; control of aphids.
Rosette, a virus Rare in U. S.	Easter lilies short, pale green, with leaves curled downward.	Use of disease-free stock; control of aphids.
Dieback, a nematode, *Aphelenchoides olesistus* Pacific Northwest in Easter lily.	Leaves thickened and twisted, or turning brown and collapsing; flower buds distorted or killed.	Bulb treatment; roguing; rotation.
Scorch, physiogenic Pacific Northwest in Croft East lily.	Brown half-moon-shaped spots in leaves.	Avoid acid soils; supply nitrogen.
NARCISSUS:		
Basal rot, a fungus, *Fusarium oxysporum* f. *narcissi* General.	Soft brown rot of basal plate spreading into scales and destroying entire bulb in field or storage.	Sorting and treatment of bulbs; cool, well-ventilated storage; rotation; soil treatment.
Nematode, *Ditylenchus* spp. General.	In leaves yellowish pimples, twisting and rolling. Distortion of stems. Rotting of bulb scales resulting in brown ring as seen in cut bulb.	Sorting and treatment of bulbs; roguing; rotation; soil treatment.
Scorch, a fungus, *Stagonospora curtisii* General.	Reddish brown leaf spots first near tip, then general under warm moist conditions. Also on Amaryllis and relatives.	Bulb treatment; rotation; sprays.

HOST Disease and Cause Distribution	Symptoms	Control
NARCISSUS cont.		
Mosaic, a virus General.	Plants dwarfed. Leaves mottled or striped with light green to bright yellow, twisted, or with epidermis roughened in narrow bands. Flowers small, streaked.	Use disease-free stock, or rogue and control aphids.
Decline, a virus complex General.	Early maturity; after flowering, leaves show streaks of white, silver, or purple, or tips wither.	Use of disease-free stock, or roguing and control of aphids.
PEONY:		
Botrytis blight, a fungus, *Botrytis paeoniae* General.	Blight of young shoots as they emerge; bud blast; flower rot; leaf spot; in cool, wet weather the gray-brown fungus covers infected parts.	Removal of tops in fall; pick off infected parts; sprays.
Phytophthora blight, a fungus, *Phytophthora cactorum* Northeast, Middle West.	Blight of young shoots, leaves, and buds; cankers on older stems; wet rot of crowns; powdery spore masses of *Botrytis* are lacking.	Removal of tops in fall; pick off infected parts; sprays.
PHLOX		
Leaf blight, physiogenic Common in warmer areas.	Withering of leaves beginning with the lowermost; defoliation.	Use of seedlings or divisions rather than old clumps; mulches.
Mildew, a fungus, *Erysiphe cichoracearum* Common in late summer.	White powdery coating on both surfaces of leaves and on stems.	Sprays or dusts. Some varieties are resistant.
Leaf spots, fungi: *Septoria divaricata*, etc. Eastern States, Middle West.	Brown circular spots with light centers.	Removal of tops in fall; sprays if necessary.
RHODODENDRON:		
Sunscald and winter injury, physiogenic Widespread.	Brown areas near tips and margins of leaves; rolling of leaves; dieback of twigs and branches.	Protection from wind and direct sun during winter; water in fall.
Dieback, a fungus, *Phytophthora cactorum* Northeastern States.	Buds and young branches wilt and shrivel; leaves turn brown and roll; cankers in older branches; water-soaked leaf spots.	Pruning of old flowers and all infected parts; sprays. Keep lilac and rhododendron apart.

HOST Disease and Cause Distribution	Symptoms	Control
RHODODENDRON cont.		
Wilt, a fungus, *Phytophthora cinnamomi* New Jersey, New York, Pennsylvania	Leaves yellow, then wilted; roots rotted; brown stem rot at soil line. In young plants, chiefly in *R. ponticum*.	Removal of infected plants; avoid excess water; mulches.
ROSE:		
Black spot, a fungus, *Diplocarpon rosae* General.	Circular black leaf spots with fimbriate (fringed) margins; yellowing and defoliation usual, less in resistant varieties.	Spray or dust hybrid tea roses regularly. Some climbers and species are tolerant.
Mildew, a fungus, *Sphaerotheca pannosa* var. *rosae* General.	At first slight curling of leaves; later conspicuous white powdery coating on leaves, buds, and shoots.	Spray or dusts.
Brown canker, a fungus, *Cryptosporella umbrina* General.	Purple spots with light center in leaves and young canes, latter extending into long cankers and dieback in spring.	Removal of infected parts, especially in spring pruning; sprays or dusts as for black spot.
ROSE:		
Common canker, a fungus, *Leptosphaeria coniothyrium* General.	Small red or yellow spots in canes enlarge to girdling cankers dotted with black fruit bodies. Weak parasite invading pruning stubs and other wounds.	Removal of infected parts. Make clean cuts close above a node when pruning or cutting blooms.
Crown gall, a bacterium, *Agrobacterium tumefaciens* General.	Usually rounded galls or overgrowths at the soil line or less frequently on aerial stems. A wound parasite.	Avoid planting infected stock. Roguing, rotation, or soil treatment.
SNAPDRAGON:		
Rust, a fungus, *Puccinia antirrhini* General.	Chocolate-brown pustules in lower leaf surface and on stems.	Sprays. Resistance available against one form of rust.
Leaf spot, a fungus, *Phyllosticta antirrhini* Eastern and North Central States.	Brown circular spots in leaves and stems with black dot fruiting bodies; sometimes girdling cankers and stem rot.	Destruction of infected plants in fall; sprays.

HOST Disease and Cause Distribution	Symptoms	Control
SNAPDRAGON cont.		
Anthracnose, a fungus, *Colletotrichum antirrhini*		
Eastern and Southern States.	Gray spots with dark borders in leaves and stems, with girdling cankers and stem rot.	Destruction of infected plants in fall; sprays.
Wilt, a fungus, *Verticillium albo-atrum*		
Northern States, California.	Yellowing, wilting, slow death.	Avoid or treat infested soil.
SWEET PEA:		
Anthracnose, a fungus, *Glomerella cingulata*		
General, except Pacific Coast.	Blighting and shriveling of leaves, flower stalks, seed pods; general wilting and dieback.	Seed treatment; destruction of infected plants in fall.
Fasciation, a bacterium, *Corynebacterium fascians*		
Widespread.	Many short, thick, and flattened overgrowths from the stem near the soil line, with stunting of the plant.	Seed treatment; use of uncontaminated soil or soil treatment.
TULIP:		
Botrytis blight, a fungus, *Botrytis tulipae*		
General, except far South and Southwest.	Primary infection in crippled, dwarfed shoots covered with gray mold; secondary small pale spots in leaves and flowers; extensive rot of leaves and flowers under moist conditions.	Sorting and cleaning of bulbs; rotation; sprays.
Gray bulb rot, a fungus, *Rhizoctonia tuliparum*		
Northeastern and Pacific States.	Plants fail to emerge; bulbs rotted with massed fungus between the scales; flattened black sclerotia on bulbs and in soil.	Use of uncontaminated soil or soil treatment.
Flowerbreak, tulip-breaking virus		
General.	Flowers flamed or feathered with patterns of light and dark colors; leaves may show mottling.	Roguing; control of aphids.
Topple, physiogenic		
Greenhouse culture.	Part of the upper flower stalk just below the opening bloom becomes water-soaked and may exude droplets; later this area collapses and the flower topples over.	Calcium nitrate seems to reduce incidence of disease, but does not give complete control.

HOST Disease and Cause Distribution	Symptoms	Control
ZINNIA:		
Blight, a fungus, *Alternaria zinniae*		
Northeast, Colorado, South Carolina.	Reddish-brown spots with light centers in leaves and stems, enlarging to large brown leaf-blighted areas and girdling stem lesions.	Seed treatment; use of uncontaminated soil or soil treatment.
Mildew, a fungus, *Erysiphe cichoracearum*		
General.	White powdery fungus growth on leaf surfaces in late summer.	Destruction of infected plants in fall; sprays or dusts if necessary.

HOST Disease and Cause Distribution	Symptoms	Control
AILANTHUS:		
Wilt, a fungus, *Verticillium albo-atrum*		
Wherever ailanthus grows.	Wilting and dying of leaves; branch and limb dieback; brownish streaks in wood.	Pruning of affected parts; fertilization; watering during dry weather; success of measures variable.
ARBORVITAE:		
Winter injury, cold and winter drying		
Wherever arborvitae grows.	Foliage turns brown in winter or spring.	Mulches over root area help to prevent.
Brown foliage in autumn, normal		
Wherever arborvitae grows.	Inner foliage turns yellow or brown in autumn and falls; outer leaves remain green.	None needed.
ASH:		
Anthracnose, a fungus, *Gloeosporium aridum*		
Wherever arborvitae grows.	Large, light-brown spots on leaves.	Usually not needed; where persistent spray with a fungicide.
Rust, a fungus, *Puccinia peridermiospora*		
Where ash and cord grasses grow in proximity.	In spring conspicuous swelling (galls) on leaves or twigs; later orange powdery spore masses on the galls.	Usually not necessary.
Wood decay, several species of fungi		
Everywhere with ash.	Softening, discoloration, crumbling of wood.	Tree surgery, pruning.
ASPEN: See Poplar.		
BASSWOOD: See Linden.		
BEECH:		
Leaf scorch, undetermined		
With beech everywhere.	Browning of leaves from margin inward usually during or following hot, dry weather.	Vigorous trees seem to be less affected than poorly growing trees.
Nectria canker, a bark louse, *Cryptococcus fagi*, followed by a fungus, *Nectria coccinea*		
New England, New York.	Small to large areas of dead bark on trunk; red pustules of spores; dead or dying branches or entire trees.	On shade trees spray with lime-sulfur to control the bark louse. For forest trees controls not sufficiently tested.
BIRCH:		
Nectria canker, a fungus, *Nectria galligena*		
With birch everywhere.	Cankers with concentric rings on trunks; trunks deformed; trees killed.	On shade trees cut out small cankers; sterilize and paint the wound.

HOST Disease and Cause Distribution	Symptoms	Control
BIRCH cont.		
Trunk decay, several fungi, *Fomes igniarius* common		
With birch everywhere.	Wood of trunk rotting; presence of fungus conks.	Tree surgery if decay not extensive.
Decline, not known		
New England.	General dying of tops and death of trees in forest stands.	None known.
BOXELDER: See Maple.		
BUCKEYE: See Horsechestnut.		
COTTONWOOD: See Poplar.		
DOGWOOD:		
Crown canker, a fungus, *Phytophthora cactorum*		
Reported from New Jersey, New York and Massachusetts. Probably occurs elsewhere.	Small, pale or sparse foliage with reddening and shriveling in summer; poor growth; dead bark at base of trunk.	Avoid injuries to base of trunk; sterilize and paint wounds; cut out small cankers. Serious and difficult to control.
Leaf and flower spots and blights, several fungi:		
Ascochyta cornicola		
Southern U. S.	Spots on leaves, shriveling, dropping.	Usually none necessary; spraying with a fungicide before disease appears probably effective.
Septoria cornicola		
With dogwood.	Leaf spots with purplish margins.	
Elsinoë corni		
Middle Atlantic seaboard.	Spots on twigs, flowers, fruits, leaves.	
Botrytis cinerea		
Probably widespread.	Aging flower petals and leaves touching them.	None necessary.
Mildew, a fungus, *Phyllactinia corylea*		
With dogwood.	Leaves appear to be covered with a white powder.	Comes late in season, no control needed.
DOUGLAS-FIR:		
Needle blight, a fungus, *Rhabdocline pseudotsugae*		
Northwest; on planted trees in the Northeast.	Reddish-brown spots on needles; defoliation.	Where justifiable spray with a fungicide.
Needle cast, a fungus, *Adelopus gaumanni*		
West; on planted trees in New England and New York.	Resembles needle blight but small black fungus fruiting bodies develop in rows on under side of needles.	Where justifiable spray with a fungicide 3 times at 2-week intervals beginning when new leaves develop in spring.
Wood decay, several species of fungi		
With the host.	Softening, shredding, crumbling of wood.	Tree surgery.

HOST Disease and Cause Distribution	Symptoms	Control
ELM:		
Black spot, a fungus, *Gnomonia ulmea* With elm.	Yellowing, falling leaves with sparse to very numerous spots, with the black fruiting bodies of the fungus on them.	Can be prevented by spraying with a fungicide.
Dieback, a fungus, *Dothiorella ulmi* General.	Wilting, yellowing, falling leaves in summer; dieback of branches; brown discoloration of current season's wood; cultures required for exact diagnosis.	Pruning affected parts and fertilization are usually effective.
Wilt, a fungus, *Verticillium albo-atrum* General.	Same as for dieback; on American and European species.	Pruning, fertilization, and watering during dry weather are sometimes effective.
Dutch elm disease, a fungus, *Ceratostomella ulmi* Northeastern U. S. west to Illinois and Missouri, south to Virginia; reported 1 year from Colorado.	Generally similar to dieback and wilt but more severe; laboratory cultures required for exact diagnosis; on all species of elm.	Spraying with DDT to control the bark beetles that spread the disease; destruction of elms infested with bark beetles. Asiatic elms generally resistant.
Wetwood or slime flux, a bacterium, *Erwinia nimipressuralis* With elm.	Slimy, commonly malodorous exudate from trunk or branches; on all species of elm.	No cure known; alleviated by installation of drain tubes in wood at or below site of fluxing
Phloem necrosis, a virus Central States.	Sudden yellowing and dropping of leaves and death of tree; inner bark discolored; on American elm.	Spraying with DDT to control *Scaphoideus luteolus*, a sucking insect that spreads the virus; resistant varieties.
Wood rots, several species of fungi With elm.	Decayed wood.	Tree surgery; pruning.
FIR:		
Twig blight, a fungus, *Rehmiellopsis balsamea* Northeastern States.	Yellowing of needles of new growth and dying of tips of twigs.	Beginning when leaf buds are half opened in spring, spray 3 times.
HAWTHORN:		
Juniper-hawthorn rust, a fungus, *Gymnosporangium globosum* Where hawthorn and juniper are growing in proximity.	Orange-red spots on leaves followed by defoliation in summer.	Beginning when rust galls swell on juniper, spray 3 times at 10-day intervals, with a fungicide.

HOST Disease and Cause Distribution	Symptoms	Control
HAWTHORN cont.		
Fire blight, a bacterium, *Erwinia amylovora* With hawthorn.	In spring, blossoms, leaves, and twigs die, become blackened, and appear as though scorched by fire; later cankers on larger branches.	Prune affected parts; cut out cankers. Spraying with a fungicide when blossoms are open probably would reduce severity. Avoid excessive stimulation of growth.
Leaf spot, a fungus, *Fabraea maculata* General.	Small, angular reddish spots on leaves in spring with possible defoliation later.	Beginning when buds open in spring spray 3 times at 7-to 10-day intervals with a fungicide.
HICKORY:		
Brooming, probably a fungus, *Microstroma juglandis* With hickory.	Excessive development of small twigs forming a compact cluster of branches.	None known.
HOLLY:		
Tar spot, a fungus, *Phacidium curtisii* South.	Black spots on leaves and berries.	In nurseries avoid crowding, turn under old leaves, remove lower branches. Spray with a fungicide in May to July.
HORSECHESTNUT:		
Leaf blotch, a fungus *Guignardia aesculi* With horsechestnut and buckeye.	Large, reddish brown spots on leaves; defoliation in summer.	Difficult. Beginning when leaf buds open spray 3 times at about 2-week intervals with a fungicide.
JUNIPER: See Redcedar		
LINDEN:		
Anthracnose, a fungus, *Gnomonia tiliae* With linden.	Irregular light-brown spots on leaves; small cankers on twigs; sometimes causing defoliation in wet seasons.	Usually not needed. If repeatedly severe, spray as for horsechestnut leaf blotch.
Black mold, several fungi, especially *Fumago vagans* With linden.	Heavy black moldlike growth on leaves; grows on the honeydew secreted by insects; occurs on many tree species.	Control of aphids and scale by spraying.
Leaf spot, a fungus, *Cercospora microsora* With linden.	Small, light-brown, circular spots on leaves.	Usually none needed.

HOST Disease and Cause Distribution	Symptoms	Control
LOCUST:		
Brooming, a virus		
Pennsylvania to Arkansas and North Carolina.	Excessive development of small twigs forming a dense cluster; on black locust.	None known.
Wood rot, a fungus, *Fomes rimosus*		
With black locust.	Decayed wood.	Tree surgery.
Canker, a fungus, *Thyronectria austro-americana*		
On honey locust.	Small cankers on twigs and branches, sometimes coalescing; reddish-brown discoloration in the wood.	Try pruning, fertilizing, and watering during dry weather.
LONDON PLANETREE:		
Canker stain, a fungus, *Endoconidiophora fimbriata platani*		
Mostly on street or park trees in a few Eastern States.	Yellowing, falling leaves in summer; sparse foliage; cankers on trunk; wood discolored.	Pruning from December through February; use of antiseptic wound paint; removal and destruction of trees with trunk cankers.
MAPLE:		
Anthracnose, a fungus, *Gloeosporium apocryptum*		
With maple.	Spots on leaves of sugar maple, along veins of Norway maple.	If repeatedly severe spray 3 times at 2-week intervals beginning when buds are partly open.
Black mold, see under Linden.		
Bleeding canker, a fungus, *Phytophthora cactorum*		
Eastern States.	Wilting leaves; trunk cankers with reddish exudate.	Fertilization; cut out cankers and sterilize wound.
Leaf scorch, not known		
With maple.	Edges of leaves or all of leaf turns brown in summer.	Fertilization, watering, proper drainage. Control uncertain.
Leaf spot, a fungus, *Phyllosticta minima*		
With maple.	Circular spots, reddish in center and with purple border.	Usually none needed.
Tar spot, two fungi, *Rhytisma acerinum* and *R. punctatum*		
With maple.	Conspicuous large or speckled black spots on leaves.	Usually none needed.
Trunk cankers, several fungi including species of *Nectria*, *Eutypella*, *Hypoxlon*		
With maple.	Dead bark; depressed areas; concentric ridges of wood; deformation.	Pruning, tree surgery.

HOST Disease and Cause Distribution	Symptoms	Control
MAPLE cont.		
Wilt, a fungus, *Verticillium albo-atrum*		
With maple.	Wilting and dying of part or all of top; greenish streaks in sapwood.	Fungus is internal. Pruning of diseased parts; fertilization; watering during dry weather.
Wood rots, several species of fungi		
With maple.	Softening, crumbling, disintegration of wood.	Tree surgery.
MIMOSA:		
Wilt, a fungus, *Fusarium perniciosum*		
New Jersey to Georgia.	Wilting, drying, dropping of leaves and brownish discoloration of sapwood.	Resistant varieties.
OAK:		
Anthracnose, a fungus, *Gnomonia veneta*		
General.	Early-season leaf spotting and defoliation; cankers on twigs.	Preventive sprays with a fungicide if severe.
Leaf blister, a fungus, *Taphrina coerulescens*		
Commonly more severe in South than in North.	Roughly circular blister on leaves.	Sprays in late winter with a fungicide while trees are dormant.
Strumella canker, a fungus, *Strumella coryneoidea*		
With oak.	Rough cankers on trunks causing distortion.	On shade trees cankers can sometimes be cut away.
Wilt, a fungus, *Endoconidiophora fagacearum*		
Kansas, Nebraska, Iowa, Minnesota, Wisconsin, Illinois, Missouri, Arkansas, Tennessee, Kentucky, Indiana, Ohio, Michigan, West Virginia, Pennsylvania, Maryland, Virginia, North Carolina.	Wilting, discolored foliage with rapid death in the red oaks; slower spread in white oak.	In the forest destroy centers of disease.
Wood decay, several species of fungi		
With oak.	Softening, crumbling, disintegration of wood.	On shade trees, pruning and tree surgery; in second-growth stands, sprouts of low origin on old stump most likely to give sound trees.
PINE:		
Black mold, a fungus, *Fumago vagans*		
With pine.	Black mold growth over needles.	Fungus grows on sugary secretion of aphids or other insects. Sprays to control the insects.

HOST Disease and Cause Distribution	Symptoms	Control
PINE cont.		
Damping-off, *Pythium* and other fungi		
With pine.	Very young seedlings fall over and die, older seedlings turn brown but remain erect.	Choose acid soils for nursery sites; acidify soil.
Needle blights, several fungi; winter injury		
With pine.	Browning, drying, dropping of needles. If caused by fungi, small black fruiting bodies present.	Spraying for fungus diseases. Mulching, watering, proper choice of planting sites to prevent winter injury.
Needle rust, several species of rust fungi.		
With pine.	In spring conspicuous yellow to orange pustules on needles.	Usually not severe enough to require treatment.
White pine blister rust, a fungus, *Cronartium ribicola*		
Widespread on white pines.	Cankers on trunk or branches; death of parts above canker; orange-colored spore masses on cankered bark.	Removal of alternate host plants (currants and gooseberries) from vicinity of white pines. Pruning, tree surgery in special cases.
Wood decays, several species of fungi		
With pine.	Softening, shredding, crumbling, disintegration of wood.	Pruning, tree surgery.
POPLAR:		
Cankers, fungi: *Cytospora chrysosperma*, *Dothichiza populea*, *Septoria musiva*		
Widespread.	On woody parts, dead areas of bark, sapwood beneath often discolored; old cankers with exposed wood and layers of callous growth.	Weak trees especially susceptible to *Cytospora*; fertilization, pruning. Some hybrids susceptible to *Septoria*.
Leaf spots, several species of fungi		
With poplar.	Small to large spots of dead tissue on leaves.	Control usually not necessary.
Rust, several species of the fungus genus *Melampsora*		
With poplar.	In summer conspicuous yellow to orange pustules on under side of leaves. Alternate hosts are hemlock, larch, Douglas-fir.	Usually none needed.
Wetwood, bacteria		
With poplar.	Lombardy poplar especially susceptible. Dying begins in top, then spreads slowly over entire tree; wood water-soaked, disagreeable odor.	None known.

HOST Disease and Cause Distribution	Symptoms	Control
REDBUD:		
Canker, a fungus, *Botryosphaeria ribis*		
Atlantic seaboard from Connecticut to North Carolina; possibly elsewhere.	Sparse foliage dying on one or more limbs in summer; cankers on limbs and trunks, with cracked bark and callus tissue at edges.	Pruning; mulching, fertilization sometimes beneficial.
REDCEDAR:		
Cedar-apple rust, a fungus, *Gymnosporangium juniperi-virginianae*		
With redcedar and apple.	Galls that bear brightly colored, elongated, gelatinous spore masses during wet weather in spring; galls annual.	Preventive fungicidal sprays. Fungus has some stages on apple which see.
Cedar-hawthorn rust, a fungus, *Gymnosporanium globosum*		
With redcedar and hawthorn.	Globose galls on twigs; spore horns in spring; galls perennial.	Preventive fungicidal sprays.
SPRUCE:		
Canker, a fungus, *Cytospora kunzei*		
Widespread.	Cankers on branches; resinous exudate.	Pruning of diseased parts.
Decline, environmental		
Widespread.	On Norway and blue spruce; dieback of top, thin foliage.	Mulches around root area; fertilization; watering during dry periods.
SYCAMORE:		
Anthracnose, a fungus, *Gnomonia veneta*		
With sycamore.	Blight of leaves and twigs in spring; often heavy defoliation; twig cankers.	Difficult to control. Apply preventive organic mercury fungicidal sprays beginning when buds start to open.
TULIP-POPLAR:		
Black mold. (See under Linden.)		
WILLOW:		
Canker, a fungus *Botryosphaeria ribis*. See redbud.		
Crown gall, the bacterium *Agrobacterium tumefaciens*		
With willow.	Swellings on roots, trunk, branches.	No cure. Removal of galls sometimes improves appearance.
Scab, a fungus, *Fusicladium saliciperdum*		
Northeastern States.	In spring blackening and dying of leaves and twigs; trees often killed.	Difficult. Try four to five fungicidal sprays beginning just before buds open and continuing at 10- to 12-day intervals until about June 15.
Wood rots, several fungi		
With willow.	Softening, shredding, disintegration of wood.	Pruning, tree surgery when advisable.

DISEASES OF SPECIAL CROPS

HOST Disease and Cause Distribution	Symptoms	Control
MINT:		
Rust, a fungus, *Puccinia menthae*		
General with crop.	Yellow to brown pustules on stems and leaves.	Early cutting, possibly fungicides and resistant varieties.
Wilt, a fungus *Verticillium albo-atrum*		
Michigan, Indiana, Oregon.	Growth distortion plus leaf bronzing and wilting.	Resistant varieties a possibility.
SAFFLOWER:		
Root rot, a fungus, *Phytophthora drechsleri*		
General with crop.	Root decay.	Resistant varieties promising.
Rust, a fungus, *Puccinia carthami*		
Great Plains area, California.	Red-brown stem and leaf pustules.	Seed treatment; resistant varieties.

DISEASES OF RUBBER (HEVEA)

HOST Disease and Cause Distribution	Symptoms	Control
RUBBER (HEVEA):		
Black crust, a fungus, *Catacauma huberi*		
South America (confined largely to Amazon basin).	Shining black incrustations on underside of leaves.	Avoidance of especially susceptible clones.
Bud-patch infection, a fungus, *Diplodia theobromae*		
Mexico, Central and South America.	Death of bud patch.	Fungicidal dip.
Glomerella dieback, a fungus, *Glomerella cingulata*		
Lower Amazon.	Decay sets in at nodes and young shoots break off while leaves still green.	Application of fertilizer to induce better growth.
Moldy rot, a fungus, *Endoconidiophora fimbriata*		
Far East; southern Mexico.	Black panel rot, followed by a whitish mold.	Fungicidal paint.
Periconia blight of Hevea, a fungus, *Periconia heveae*		
Costa Rica; Bahia and the Amazon region of Brazil; Mexico.	Lesions on both petioles and leaves.	Practically disappears during the dry season.
Phytophthora leaf fall and twig dieback, a fungus, *Phytophthora palmivora*		
Throughout the Tropics.	Leaf fall, twig dieback, panel decay, and pod rot.	Fungicidal sprays; top budding with tolerant clones.
Pink disease, a fungus, *Corticium salmonicolor*		
Far East; west coast of Guatemala.	Pink incrustation of the bark, usually at a fork in the stem.	Treatment with coal-tar preparation to reduce inoculum.
South American leaf blight, a fungus, *Dothidella ulei*		
Mexico, Central and South America.	Small necrotic lesions on leaves; twig dieback.	Fungicidal sprays in nursery; top budding with blight-resistant clones.
Target leaf spot, a fungus, *Pellicularia filamentosa*		
South America.	Leaf lesions ranging up to 2 inches in diameter; silvery fungus threads on under surface.	Fungicidal sprays.

DISEASES OF SUGAR CROPS

HOST Disease and Cause Distribution	Symptoms	Control
SORGO:		
Anthracnose, a fungus, *Colletotrichum graminicola* General.	Small, round, red or purple leaf spots.	Resistant varieties.
Red rot, a fungus, *Colletotrichum graminicola* General.	Stalk rot-red, orange, or purple discoloration of the pith.	Resistant varieties.
Rust, a fungus, *Puccinia purpurea* General.	Raised, reddish pustules on leaf surfaces.	Resistant varieties.
Zonate leaf spot, a fungus, *Gloeocercospora sorghi* Florida, Louisiana, Georgia, Mississippi, and Texas.	Wide bands of reddish-purple alternating with straw-colored tissue on leaves.	Resistant varieties.
SUGAR BEET:		
Bacterial canker, a bacterium, *Xanthomonas beticola* General.	Irregular, rough galls (up to 3/4 inch diameter) on crown and other exposed parts of root; interior of overgrowth yellow.	Crop rotation.
Beet mosaic, a virus Nebraska, Colorado, and westward.	Yellow mottling or spotting on leaves, especially younger ones.	No control measures practiced.
Black root (acute type), fungi: *Pythium* spp., *Pellicularia filamentosa*, *Phoma betae*, *Aphanomyces cochlioides* General.	Very young seedlings topple over from death of root and hypocotyl; diseased parts turn black; pathogens may also kill seedlings as they emerge from seed ball.	Crop rotation with early fall plowing of legume crops before beets; liberal use of phosphate fertilizer; drainage; seed treatment; prompt cultivation of young plants.
Black root (chronic type), a fungus, *Aphanomyces cochlioides* General.	Young plants remaining in row and not damped-off show blackened lateral feeding roots; tip of main root may be killed, causing sprangling of roots.	Disease-resistant varieties.
Crown gall, a bacterium, *Agrobacterium tumefaciens* General.	Large, smooth galls (usually 1 to 4 inches or more in diameter) on roots; interior of overgrowth, white.	Crop rotation.

HOST Disease and Cause Distribution	Symptoms	Control
SUGAR BEET cont.		
Curly top, a virus		
West of Continental Divide; occasionally found in eastern Colorado, Nebraska, and neighboring States.	Up-curled leaves; older leaves have thickened veins, frequently with prickly outgrowths; youngest leaves have cleared veinlets; roots dwarfed; excessive number of feeding roots are formed ("hairy root"); when cut across, roots may show concentric black rings.	Resistant varieties.
Downy mildew, a fungus, *Peronospora schachtii*		
California, Oregon, and Washington.	Sooty gray growth of mold covers younger leaves; frequently bud is killed.	Resistant varieties.
Fusarium yellows, a fungus, *Fusarium conglutinans betae*		
Colorado, Nebraska, South Dakota, Montana, and Wyoming.	Wilting; foliage yellowed and dwarfed; central core of root discolored.	Crop rotation; heavy phosphate applications.
Leaf spot, a fungus, *Cercospora beticola*		
General.	Gray spots about 1/8 inch diameter on leaf blades, petioles, seed stalks and floral parts; spots on leaves may coalesce and cause blighting.	Resistant varieties.
Nematode, *Heterodera schachtii*		
General; most severe in West.	Affected plants wilt and remain stunted; roots of infected beets have numerous, small (pinhead size), lemon-shaped white bodies (the female nematodes); later, taproot shows same infection, but the bodies may be yellow or brown (the nematode cysts).	Prevention: Sugar beet crops should not be grown oftener than 1 crop in 5 years. Nonsusceptible crops kept free from weeds should be grown in interim.
Rhizoctonia crown rot, a fungus, *Pellicularia filamentosa*		
General.	Part or all of foliage dies and dries after the root becomes decayed, usually at crown.	Crop rotation; prevention of acute-type black root.
Rhizoctonia foliage blight, a fungus, *Pellicularia filamentosa*		
Maryland, Virginia, Michigan, Ohio, Minnesota, Nebraska, and Colorado.	Blackened, killed areas 1/2 to 3/4 inch across appear on leaf blades in early summer; soon surrounded by secondary killed areas. Outbreaks are associated with very rainy weather or periods of high humidity.	Crop rotation.

HOST Disease and Cause Distribution	Symptoms	Control
SUGAR BEET cont.		
Savoy, a virus		
Maryland, Virginia, and westward through Wyoming and Montana.	Leaves puckered, downcurled; resemble savoy cabbage. Veins thickened. Flesh of root glassy; in cross-section shows concentric black rings. Central core discolored.	No control measures practiced.
Storage rot, fungi: *Phoma betae*, *Pellicularia filamentosa*, *Botrytis cinerea*, *Rhizopus nigricans*, *Fusarium* spp.		
General.	Brown or black decay of sugar beets in factory storage piles.	Cooling of storage piles by ventilation with cold night air; resistant varieties.
Virus yellows, a virus		
California, Oregon, Washington, Utah, Colorado, Michigan, and Maryland.	Outer leaves yellowed, especially at the tips; they become thick and brittle.	Control of aphid vectors of the virus; removal of overwintering plants that are sources of virus.
SUGARCANE:		
Brown spot, a fungus, *Cercospora longipes*		
All areas.	Reddish-brown leaf spot with yellow areole.	Resistant varieties.
Chlorotic streak, a virus		
Louisiana.	Yellowish-white linear streaks with wavy outline on leaves.	Resistant varieties, roguing, and seed selection.
Eyespot, a fungus, *Helminthosporium sacchari*		
Florida, Georgia.	Straw-colored leaf spot extending into long streak or "runner".	Resistant varieties.
Pineapple disease, a fungus, *Endoconidiophora paradoxa*		
All areas.	Seed-piece rot (sooty black interior); pineapple odor.	Resistant varieties.
Mosaic, a virus		
All areas.	Irregular-shaped chlorotic areas distributed throughout the normal green tissue.	Resistant varieties, seed selection, and roguing.
Red rot, a fungus, *Colletotrichum falcatum*		
All areas.	Leaf spot (elongate red areas on midrib); seed-piece rot (longitudinal reddening interrupted by white patches).	Resistant varieties.
Root rot, fungi: *Pythium arrhenomanes* and other species		
All areas.	Soft, watery rot of root tips and rootlets.	Resistant varieties.

DISEASES OF TOBACCO

HOST Disease and Cause Distribution	Symptoms	Control
Bacterial wilt, a bacterium, Xanthomonas solanacearum South Atlantic area.	Wilt plus dark streaks in woody part of stem.	Resistant varieties and rotation.
Blackfire, a bacterium, Pseudomonas angulata Epidemic outbreaks may occur in Kentucky, Tennessee, Virginia, and North Carolina.	Dark-colored leaf spots, often angular.	Resistant varieties available soon.
Black root rot, a fungus, Thielaviopsis basicola All northern areas and extending south to include Tennessee and western North Carolina.	Dark-colored root lesions.	Resistant varieties.
Black shank, a fungus, Phytophthora parasitica var. nicotianae South Atlantic area, also Tennessee and Kentucky.	Wilt plus decay of roots and base of stalk.	Resistant varieties and rotation.
Blue mold, a fungus, Peronospora tabacina All major tobacco areas except Wisconsin.	Leaf spots with a fungus mold growth on the lower surface.	Regular spraying or dusting with a fungicide.
Fusarium wilt, a fungus, Fusarium oxysporum var. nicotianae Kentucky, South Carolina, North Carolina; occasional elsewhere.	Wilt on one side of plants.	Resistant varieties and rotation.
Mosaic, a virus All areas.	Green and yellow mottling conspicuous on young leaves.	Sanitation and resistant varieties.
Nematode root rot, a nematode, Pratylenchus sp. South Atlantic area.	Reddish-brown root decay.	Rotation and soil fumigation.
Root knot, a nematode, Meloidogyne sp. South Atlantic area.	Roots swollen and knotted.	Rotation and soil fumigation.
Wildfire, a bacterium, Pseudomonas tabaci Tennessee, Kentucky, Pennsylvania; occasionally severe in other areas.	Rounded leaf spots, often with a yellow border.	Fungicides in the plant bed; resistant varieties soon.

DISEASES OF VEGETABLE CROPS

HOST Disease and Cause Distribution	Symptoms	Control
ASPARAGUS:		
Rust, a fungus, *Puccinia asparagi* Widespread.	Shoots produced after harvest develop pustules that break open and expose reddish-brown, powdery masses of spores; in fall, these pustules and others show black spore masses.	Destruction of volunteer plants near field; isolation of seedbeds from older plantings. Varieties Mary and Martha Washington have some resistance.
Wilt, a fungus, *Fusarium* sp. Widespread.	Yellowing, stunting, and often wilting of growing stalks.	Do not replant asparagus where disease has been severe.
BEAN:		
Common blight, bacteria: *Xanthomonas phaseoli* and *X. phaseoli* var. *fuscans* Widespread east of Continental Divide.	Small water-soaked leaf and pod spots; later large, brown dead areas on leaves and enlargement of pod spots.	Use of seed grown in arid sections; crop rotation.
Curly top, a virus Some Western States.	Seedlings killed; crinkling and cupping of older leaves; yellowing and stunting of plant.	Resistant varieties.
Halo blight, a bacterium, *Pseudomonas phaseolicola* Widespread east of Continental Divide.	Small, water-soaked leaf and pod spots; greenish-yellow circle around leaf spots; later large dead areas on leaves and enlargement of pod spots.	Use of seed grown in arid sections; crop rotation.
Mosaic, a virus Widespread.	Leaf mottling, blistering, and pod distortion.	Resistant varieties.
Powdery mildew, a fungus, *Erysiphe polygoni* Most important in Southeastern States.	White powdery areas on leaves.	Sulfur dusts.
Root rot, a fungus, *Fusarium solani* f. *phaseoli* Widespread.	Reddish discoloration of root.	Crop rotation.
Rust, a fungus, *Uromyces phaseoli typica* Florida, Mountain and Pacific Coast States.	Rusty pustules on leaves that turn black later in season.	Sulfur dusts.
Watery soft rot, a fungus, *Sclerotinia sclerotiorum* Some Southern, Mountain, and Pacific Northwest States.	Watery spots on leaves; masses of white fungus growth on stems and pods; black sclerotia formed in this mat.	Crop rotation.

HOST Disease and Cause Distribution	Symptoms	Control
BEAN, LIMA:		
Bacterial blight, bacteria: *Xanthomonas phaseoli*, *Pseudomonas phaseolicola*, *P. syringae* Widespread east of Continental Divide.	Same as common blight of bean.	Use of seed grown in arid sections.
Downy mildew, a fungus, *Phytophthora phaseoli* North Atlantic Seaboard.	White, cottony growth on pods, young leaves, shoots, and flowers.	Copper sprays.
Pod blight, a fungus, *Diaporthe phaseolorum* Eastern and Southern States.	Brown patches of irregular shape on leaves; dark-brown spots on pods.	Bordeaux mixture; crop rotation.
Root knot, a nematode, *Meloidogyne* spp. Southern States and California.	Fleshy irregular-shaped galls on roots.	Crop rotation.
Stem anthracnose, a fungus, *Colletotrichum truncatum* Southern States.	Brick-red discoloration of veins on under side of leaves; red spots on pods.	Use of seed grown in arid sections.
BEET:		
Black root, fungi: *Pythium* sp., *Rhizoctonia solani*, *Pleospora betae*, *Aphanomyces cochlioides* Widespread.	Damping-off of seedlings; black lesions on older roots; with some fungi, root decay.	Seed treatment with thiram, New Improved Ceresan, or Phygon; crop rotation and well-tilled seedbeds.
Boron deficiency, nonparasitic disease Northern States.	Young leaves turn black and die; root tissue shows black rings; cankers may appear on surface.	Application of borax to soil with fertilizer.
Cercospora spot, a fungus, *Cercospora beticola* Widespread.	Small, circular spots on leaves and petioles with definite margins deeper in color than surrounding tissue.	Crop rotation.
Curly top, a virus Some Western States.	Inward rolling of young leaves and puckering; older leaves turn yellow and die; necrosis of phloem tissue of root.	None.
Phoma leaf spot, a fungus, *Phoma betae* Widespread.	Some spotting on old leaves; dry, black rot of roots in storage.	Crop rotation; seed treatment as for black root.

BROCCOLI and BRUSSELS SPROUTS: Blackleg, Black rot, Clubroot. See under CABBAGE.

HOST Disease and Cause Distribution	Symptoms	Control
CABBAGE:		
Blackleg, a fungus, *Phoma lingam*		
Widespread.	Large spots with ashen-gray centers on leaves, stems, and seed pods; spots show black specks (pycnidia) on their surfaces; stem cankers at ground line extending to roots.	Three-year rotation. Western-grown seed is usually free from the blackleg fungus.
Black rot, a bacterium, *Xanthomonas campestris*		
Chiefly east of the Continental Divide.	Large V-shaped spots at leaf margins that turn brown and dry; veins darkened; affected leaves drop; soft rot bacteria enter through infected tissue and cause heads to rot.	See Blackleg. Also treat seed in hot water at 122° F. for 30 minutes.
Clubroot, a fungus, *Plasmodiophora brassicae*		
Northern United States.	Enlarged clublike swellings on roots.	Avoid infested soil; select clean soil for plant beds; avoid transfer of infectious soil or plant materials by farm implements or drainage water.
Downy mildew, a fungus, *Peronospora parasitica*		
Chiefly in coastal areas.	White downy growth of fungus on lower surface of leaves followed by yellow spotting on upper surface; most damaging in seedbeds.	Ferbam or Spergon sprays or dusts.
Mosaic, viruses		
Widespread.	Mottling and vein clearings with some necrotic spotting.	Isolation of seedbeds from plants that may serve as virus reservoirs.
Ring spot, a fungus, *Mycosphaerella brassicicola*		
Pacific Coast areas near sea. Damaging to seed crops.	Spotting of all above-ground parts of plants; spots are small, dark, and turn gray on leaves; small, black fungus fruiting bodies occur in concentric zones on the spots.	Disposal of infected crop refuse and rotation.
Sclerotinia disease, fungi: *Sclerotinia sclerotiorum*, *Sclerotinia minor*, and *Sclerotinia intermedia*		
Southern States and humid sections of Pacific Coast.	Fungus in soil infects stem and causes a watery soft rot with white cottony growth of fungus on stem; collapse of plant follows.	Crop rotation.
Yellows, a fungus, *Fusarium oxysporum* f. *conglutinans*		
Widespread.	One-sided yellowing of foliage beginning with the lower leaves; affected leaves drop and growth is checked; vascular bundles are blackened.	Resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
CARROT:		
Bacterial blight, a bacterium, *Xanthomonas carotae*		
Chiefly in Southwestern States and California.	Brown, water-soaked spots on leaves that become brittle and have a yellow margin; some leaves are killed; roots develop elongate, craterlike dark spots.	Hot-water treatment of seed at 127° F. will disinfect seed. Avoid infested fields.
Bacterial soft rot (storage disease), a bacterium, *Erwinia carotovora*		
Widespread.	Soft watery decay of root.	Careful handling of crop.
Black rot, a fungus, *Alternaria radicina*		
Common on carrots in storage.	Leaf spotting similar to cercospora blight; roots in storage develop greenish-black to jet black decay; black moldy growth on surface.	Sanitation and crop rotation.
Cercospora blight, a fungus, *Cercospora carotae*		
Widespread.	Small chlorotic leaf spots which later enlarge and develop into spots with pale necrotic centers and dark borders.	Sprays or dusts with zineb, bordeaux mixture, or insoluble copper sprays; also rotation and sanitation.
Yellows, aster yellows virus		
Widespread.	Yellowing and vein clearing of young leaves; old leaves are twisted and yellowed.	DDT spray to kill leafhoppers that spread the virus.
CAULIFLOWER: Blackleg, Black rot, Clubroot, Downy mildew, Ring spot. See under CABBAGE.		
CELERY:		
Aster yellows, a virus (western strain of aster yellows virus)		
Common in California and has occurred in Middle West.	Stalks brittle and often twisted and cracked; leaves yellowed and distorted.	No effective control.
Bacterial blight, a bacterium, *Pseudomonas apii*		
Widespread.	Rusty-brown, irregularly circular spots; somewhat like small spots of late blight but have no dark specks in centers.	Control as for early blight.
Bacterial soft rot, a bacterium, *Erwinia carotovora*		
Widespread.	Soft, mushy decay in transit or storage following bruising or freezing in field; also follows blackheart injury.	Care in harvest and prompt cold storage.
Blackheart, nonparasitic disease caused by sudden saturation of soil with water		
Widespread.	Blackening and decay of leaves at heart of plant.	Prevent sudden increase of moisture in the soil.

HOST Disease and Cause Distribution	Symptoms	Control
CELERY cont.		
Early blight, a fungus, *Cercospora apii*		
Widespread.	Circular, yellowish spots that turn brown and may enlarge to 1/2 inch in diameter; elongated spots on leaf stalks	Copper fungicides, zineb, nabam (with zinc sulfate), ferbam or ziram depending on local recommendation. Emerson Pascal is somewhat resistant.
Fusarium yellows, a fungus, *Fusarium oxysporum* f. *apii*		
In many celery-growing regions in the North and in Southern California.	Seedlings wilt suddenly; older plants show yellowing and are stunted; some root injury; plants finally collapse and die.	Resistant varieties.
Late blight, fungi: *Septoria apii* and *S. apii-graveolentis*		
Widespread.	Leaves develop many yellow spots that turn dark and have tiny black specks (pycnidia) on their surface; leaf stalks also are spotted.	Fungus is seedborne and usually dies before seed loses viability. Three-year-old seed is recommended. In the field use an 8-8-100 bordeaux mixture or copper dusts.
Mosaic, a virus		
Widespread.	Green and yellow mottling of leaves and stunting of plants; some viruses cause brown spotting of stalks.	Eradication of wild host plants near fields; insecticides to control aphid vectors.
Sclerotinia, fungi: *Sclerotinia sclerotiorum*, *S. minor*, and *S. intermedia*		
Most important in South but occurs on northern crops in storage.	Rot at base of crown and leaf stalks; tissues become watery, pinkish in color, and show a white growth of fungus; black sclerotial bodies are formed.	Difficult to control when climate favors the disease. In Florida, flooding land for 6-8 weeks in summer is best means of control.
CUCUMBER:		
Angular leaf spot, a bacterium, *Pseudomonas lachrymans*		
Humid and semihumid regions.	Small, water-soaked, angular spots that dry and become gray; fruits show water-soaked spots followed by brown rot of tissues under the spot.	Seed treatment by soaking for 5 minutes in a 1-1,000 solution of corrosive sublimate and rinsing in water. Crop rotation. Copper fungicides will check the disease.
Anthracnose, a fungus, *Colletotrichum lagenarium*		
East of Continental Divide.	Leaves show large, brown angular or circular spots; tan cankers on stems and petioles; on fruits, dark, circular, sunken spots with pinkish spore masses at center in moist weather.	Seed treatment as for angular leaf spot or Semesan dusts; ziram, ferbam, zineb, or nabam (used with zinc sulfate) sprays or dusts; crop rotation.

HOST Disease and Cause Distribution	Symptoms	Control
CUCUMBER cont.		
Bacterial wilt, a bacterium, *Erwinia tracheiphila*		
East of the Continental Divide; more common in Northern States than in the South.	Wilting begins with a single leaf and gradually extends until vine is killed.	Control of cucumber beetles that spread the bacteria. In small gardens, removing wilted plants is advisable.
Damping-off, fungi: *Pythium* spp. and *Rhizoctonia solani*		
Widespread.	Seed decay and wilting and death of young seedlings.	Dusting of seed with thiram, Semesan, or Spergon.
Downy mildew, a fungus, *Pseudoperonospora cubensis*		
Along Atlantic seaboard and Gulf Coast.	Leaves show many rather angular, yellow spots and wither and die.	Spray or dust with copper fungicides or with ziram, zineb, or nabam (with zinc sulfate).
Mosaic, a virus		
Widespread.	Yellow mottling of leaves and fruits; plants stunted and leaves of later growth dwarfed.	Resistant varieties. Perennial weeds carry the virus and should be destroyed near cucumber plantings.
Scab, a fungus, *Cladosporium cucumerinum*		
Chiefly in Northern States-Wisconsin to Maine.	Brown spotting of leaves; fruits show sunken, corky spots with olive-green spore masses in moist weather.	Resistant varieties; crop rotation.
EGGPLANT:		
Phomopsis blight, a fungus, *Phomopsis vexans*		
Widespread but most severe in South.	Brown, oval or irregular spots with gray centers on leaves; dark decay of fruits covering much of surface.	Crop rotation and resistant varieties.
Verticillium wilt, a fungus, *Verticillium albo-atrum*		
Common in Northern States.	Yellowing of lower leaves, discoloration of woody tissue of stem and stunting of plant.	No satisfactory control.
LETTUCE:		
Aster yellows, a virus		
Most serious in Northeastern States.	Yellowing and curling of inner leaves on which brown spots occur; in older plants one side only may be yellowed.	Insecticides to destroy the leafhopper that carries the virus.
Bottom rot, a fungus, *Rhizoctonia solani*		
Widespread; most common on muck land.	Dead spots appear on petioles and mid-ribs of leaves that touch soil; slimy, soft rot of head follows leaf infection.	Well-drained soil and rotation with crops such as sweet corn or onion that are not attacked by the fungus.

HOST Disease and Cause Distribution	Symptoms	Control
LETTUCE cont.		
Downy mildew, a fungus, *Bremia lactucae*		
Widespread.	Yellow areas on upper surface of leaf and downy white growth on under side; spots turn brown.	Spraying or dusting of plant beds with ferbam or zineb.
Drop, fungi: *Sclerotinia sclerotiorum* and *S. minor*		
Widespread.	Under moist conditions the outer leaves wilt and there is a slimy rot of the plant; cottony fungus growth on stem near soil.	Use well-drained soil and avoid crowding plants in the field. In the greenhouse, sterilize soil.
Mosaic, a virus		
Widespread.	Mottling and yellowing of leaves and stunting of plants.	Use insecticides to destroy aphids that transmit the virus.
Tipburn, nonparasitic disease		
Widespread.	Brown discoloration of leaf tissue at the margins of the leaves.	Several recently introduced varieties are somewhat less susceptible than older ones.
MUSKMELON:		
Alternaria leaf blight, a fungus, *Alternaria cucumerina*		
Widespread.	Leaves develop small, tan spots that enlarge and show concentric markings.	Spray or dust with ziram, zineb, or spray with nabam (used with zinc sulfate); crop rotation.
Anthracnose, a fungus, *Colletotrichum lagenarium*		
Widespread.	Brown, circular or angular spots on leaves; spots on stems and petioles; dark, sunken spots on fruits with pinkish spore masses in centers in moist weather.	Dusting seed with Semesan or soaking for 5 minutes in a 1-1,000 solution of corrosive sublimate and rinsing in water; spray or dust as for alternaria spot; crop rotation.
Bacterial wilt. See under CUCUMBER.		
Damping-off, fungi: *Pythium* spp. and *Rhizoctonia solani*		
Widespread.	Seed decay and wilting and death of young seedlings.	Dusting of seed with thiram, Semesan, or Spergon.
Downy mildew, a fungus, *Pseudoperonospora cubensis*		
Chiefly along Atlantic seaboard.	Yellow to reddish-brown spots on under side of leaves; on lower sides a purplish mildew. Leaves wither and curl upward.	Spray or dust with copper fungicides, ziram, or zineb; or spray with nabam (used with zinc sulfate).

HOST Disease and Cause Distribution	Symptoms	Control
MUSKMELON cont.		
Fusarium wilt, a fungus, *Fusarium oxysporum* f. *melonis* Northern States.	Wilting of one or more branches; leaves turn brown; streaks on stems; plant finally dies.	Resistant varieties; crop rotation.
Powdery mildew, a fungus, *Erisyphe cichoracearum* Most important in Southern California.	White growth of fungus on leaves and stems.	Resistant varieties. Sulfur effective but causes injury at high temperatures.
ONION:		
Bacterial soft rot, a bacterium, *Erwinia carotovora* Widespread in storage.	Slimy yellow rotting of bulbs.	Mature crop well and cure bulbs thoroughly before storage. Careful sorting at harvest and at packing.
Downy mildew, a fungus, *Peronospora destructor* In most States where onions are grown.	Violet downy spots on leaves; plants may be dwarfed, distorted, and pale green.	Avoid poorly drained soils; dust with mixture of zineb and sulfur.
Neck rot, fungi: *Botrytis allii*, *B. byssoidea*, *B. squamosa* Widespread in storage.	Softening at neck of bulb followed by grayish mold; later formation of small, hard, black sclerotia.	Grow colored rather than white varieties; allow tops to mature before harvest. Artificial curing reduces losses.
Pink root, a fungus, *Pyrenochaeta terrestris* Widespread.	Affected roots turn pink, shrivel, and die; bulbs are small.	Do not plant on severely infested soil.
Purple blotch, a fungus, *Alternaria porri* Southern and irrigated areas.	Small, white, sunken lesions with purple centers which enlarge and girdle leaf; leaves and stems fall over.	No field control. Storage measures as for neck rot.
Smudge, a fungus, *Colletotrichum circinans* Northeastern and Midwestern States.	Smudgy, roughly circular spots on scales of bulb; dark green at first, becoming black with age.	Use colored varieties; protect from rain after harvest; cure promptly.
Smut, a fungus, *Urocystis cepulae* Northern States.	Raised blisters near base of scales which break open and expose black powdery masses of spores.	Dilute formaldehyde applied to soil with the seed; Arasan seed treatment.

HOST Disease and Cause Distribution	Symptoms	Control
PEA:		
Aphanomyces root rot, a fungus, *Aphanomyces euteiches*		
Widespread.	Decay of root and stem 1 to 2 inches above ground; outer portion of root slips readily from central cylinder; leaves shrivel and plant may die.	Long crop rotations; fertile, well-drained soil.
Ascochyta blight, fungi: *Ascochyta pisi*, *A. pinodella*, *Mycosphaerella pinodes*		
Widespread east of Continental Divide.	Tan leaf spots with brown borders; on pods, circular sunken spots. Black to purplish streaks on stem.	Use of seed grown in semiarid sections of West.
Bacterial blight, a bacterium, *Pseudomonas pisi*		
Widespread.	Water-soaked leaf, stem, and pod spotting; later the infected spots turn brown.	Use of seed grown in semiarid sections of West.
Fusarium root rot, a fungus, *Fusarium solani* f. *pisi*		
Widespread.	Dark-brown to brick-red discoloration of roots.	Crop rotation.
Fusarium wilt, a fungus, *Fusarium oxysporum* f. *pisi*		
Midwestern and Northwestern States.	Downward curling of leaflets, stunting and wilting of plant, and orange-brown discoloration of vascular system.	Resistant varieties.
Mosaic, a virus		
Widespread.	Mottling and malformation of leaves and stunting of plant.	Control of the pea aphid (the vector) and eradication of legumes growing wild close to pea fields.
Powdery mildew, a fungus, *Erysiphe polygoni*		
Widespread.	White, powdery, dustlike coating on leaves, stems, and pods.	Sulfur dusts.
PEPPER:		
Anthracnose, a fungus, *Gloeosporium piperatum*		
Widespread.	Fruits with large, dark, circular, sunken spots; salmon-colored masses of spores appear in center of spots in moist weather.	Seed disinfection as for bacterial spot; application of zineb, nabam (with zinc sulfate), or ziram.
Bacterial spot, a bacterium, *Xanthomonas vesicatoria*		
Widespread; chiefly on sweet peppers.	Leaf spots with light centers and dark margins; if numerous, remain brown. Severely spotted leaves yellow and drop. Fruits with small, brown, roughened, corky spots.	Seed treatment by soaking for 5 minutes in 1-2, 000 solution of corrosive sublimate and rinsing in water; crop rotation.

HOST Disease and Cause Distribution	Symptoms	Control
PEPPER cont.		
Bacterial wilt, a bacterium, *Xanthomonas solanacearum*		
Chiefly in Southeastern States.	General wilting and collapse of plants with little yellowing of leaves.	Crop rotation; well-drained soil.
Blossom-end rot, nonparasitic disease		
Widespread on sweet peppers.	Water-soaked spots that become dry, light-colored, and papery. Fungi often invade spots and cause them to become dark.	Avoid soils that dry out quickly after rain. If plants can be watered, maintain an even soil moisture supply.
Cercospora leaf spot, a fungus, *Cercospora capsici*		
Chiefly in Southeastern States on sweet and hot peppers.	Large circular or oblong spots on leaves and stems; spots with dark-brown margins and gray centers; severely infected leaves drop.	Seed treatment as for anthracnose. Where severe, use zineb, nabam (with zinc sulfate), or ziram.
Mosaic, viruses		
Widespread.	Varying types of yellow and green leaf mottling, curling, and distortion; fruits may be yellowed, shriveled, or mottled.	Destruction of perennial weeds near seedbeds; insecticides to destroy insect carriers; resistant varieties.
POTATO:		
Black leg, a bacterium, *Erwinia atroseptica*		
Widespread.	Soft rot or a dark shriveling at base of stem; tubers from diseased plants may decay.	Destruction of potato refuse piles to prevent spread of disease from them; planting of seed as soon as cut or holding in cool, ventilated place.
Common scab, a fungus, *Streptomyces scabies*		
Widespread.	Tubers have superficial, roughened areas or more deeply pitted, corky, rough spots.	Clean seed; crop rotation; treatment of seed tubers. Tolerant varieties are available.
Early blight, a fungus, *Alternaria solani*		
Widespread, chiefly east of Continental Divide.	Leaves develop dark-brown, oval or angular spots with concentric markings; older foliage often killed; shallow dry rot of tubers.	Zineb or nabam (with zinc sulfate) sprays or dusts.
Fusarium wilt and tuber rot, a fungus, *Fusarium* spp.		
Widespread.	Yellowing and wilting of plants and browning or dry rot of tubers.	Certified seed tubers; crop rotation.

HOST Disease and Cause Distribution	Symptoms	Control
POTATO cont.		
Late blight, a fungus, *Phytophthora infestans*		
Widespread; chiefly in humid areas.	Large, dark, water-soaked spots, turning brown with white mildew on surface in moist weather; brown dry rot of tuber that may become soft in storage.	Resistant varieties; bordeaux mixture, zineb, or nabam (with zinc sulfate) sprays.
Leaf roll, a virus		
Widespread.	Leaflets roll upward and inward; leaves are tough and leathery; plants are stunted; net necrosis of tubers.	Certified seed tubers. Resistant varieties available.
Mosaic diseases, viruses		
Widespread.	Various types of leaf mottling, curling, or crinkling; plants usually somewhat stunted and yields reduced.	Certified seed; insecticides to destroy aphids that transmit viruses. Some varieties are resistant to certain mosaic viruses.
Rhizoctonia, a fungus, *Rhizoctonia solani*		
Widespread.	Killing of sprouts before emergence; stems are cankered and may produce aerial tubers; tubers have small, black areas on surface.	Clean seed stock. Shallow planting reduces stem decay.
Ringrot, a bacterium, *Corynebacterium sepedonicum*		
Widespread.	Yellowing, marginal browning, and drooping of leaflets; cut tubers show brown discoloration of vascular ring and a bacterial ooze.	Certified seed. If disease occurs, disinfect bins, crates, bags, and cultivating machinery. Disinfect knives frequently when cutting seed tubers. Tolerant varieties available.
Southern bacterial wilt, a bacterium, *Xanthomonas solanacearum*		
Chiefly in Southeastern States.	Bronzing and shriveling of leaflets; wilting and death of plant; brown decay of tubers.	Use certified seed and avoid infested soil. A few varieties are moderately resistant.
RADISH:		
Black root, a fungus, *Aphanomyces raphani*		
Widespread.	Black patches on roots, extending below surface. Most important on long-rooted icicle type varieties.	Crop rotation. Do not plant long-rooted varieties where disease has been severe.
White rust, a fungus, *Albugo candida*		
Widespread.	Raised, white, shiny pustules that merge to form large patches on leaves.	No effective control.

HOST Disease and Cause Distribution	Symptoms	Control
RHUBARB:		
Anthracnose, a fungus, Colletotrichum erumpens		
Widespread.	Oval, translucent spots with black centers on stalks.	No effective control.
Ascochyta leaf spot, a fungus, Ascochyta rhei		
East of Continental Divide.	Large, circular, dark spots whose centers crack and tear.	No effective control.
Crown rot, fungi: Phytophthora cactorum and P. parasitica		
Eastern States.	Brown sunken spots at base of leaf stalks followed by collapse of leaves. Rapid rotting of crown.	Dig and destroy infected plants; spray with bordeaux mixture.
SPINACH:		
Damping-off, fungi: Pythium spp. and Rhizoctonia solani		
Widespread.	Decay of germinating seed and wilting and death of seedlings after emergence.	Seed treatment with thiram, Phygon, cuprous oxide, or zinc oxide.
Downy mildew, a fungus, Peronospora effusa		
Widespread in coastal areas.	Pale yellow spots on leaves, with grayish-purple, downy growth on their under surfaces in moist weather.	No very satisfactory control.
Mosaic, viruses		
Widespread.	Leaves mottled with yellow; plants stunted.	Resistant varieties.
White rust, a fungus, Albugo occidentalis		
Serious in Texas, Arkansas, and Oklahoma.	White, blisterlike pustules, chiefly on lower sides of leaves.	No satisfactory control.
SQUASH AND PUMPKIN:		
Bacterial wilt, downy mildew, mosaic, powdery mildew, same as with cucumber		
Widespread.	Similar to those on cucumber.	As with cucumber, but no resistant varieties.
SWEETPOTATO:		
Black rot, a fungus, Endoconidiophora fimbriata		
Widespread in storage.	Small, black spots on stems below and at soil line; dark-green to black, circular, depressed spots with a shallow decay in fleshy roots.	Clean planting stock and disinfection for 10 minutes in 1-1,000 corrosive sublimate or in a 2 1/2 percent borax solution. Sanitation, rotation, and careful sorting before storage.
Internal cork, a virus		
Widespread in Southeastern States.	Ring spot, bronzing, and some drop of leaves; black, hard, corky spots in fleshy roots.	No satisfactory control.

HOST Disease and Cause Distribution	Symptoms	Control
SWEETPOTATO cont.		
Scurf, a fungus, *Monilochaetes infuscans* Widespread.	Brown, discolored spots on fleshy roots that may cover entire surface; shrinkage in storage.	Careful selection of seed stock; seed treatment with corrosive sublimate as for black rot; crop rotation.
Soft rot, a fungus, *Rhizopus nigricans* Widespread in storage.	Soft, watery rot of fleshy tissue which shows dark tufts of fungus growth; sometimes tissues shrink causing a dry rot.	Sanitation of storage rooms. Avoid bruising or wounding the roots; store at proper temperature.
Soil rot, a fungus, *Streptomyces ipomoea* Widespread.	Leaves small and pale green; black specks on fibrous roots and underground stem; sweetpotatoes show pits with jagged margins.	No adequate control. Use clean seed and rotate crop.
Stem rot, a fungus, *Fusarium oxysporum* f. *batatas* Widespread.	Yellowing of young leaves; blackening of inner tissues and rupturing of stem; when cut, fleshy roots show blackened ring.	Clean seed stock; crop rotation. Use clean soil for bedding and treat seed stock as for black rot.
TOMATO:		
Anthracnose, a fungus, *Colletotrichum phomoides* Central and Atlantic States.	Slightly depressed spots about 1/2 inch in diameter on fruits; concentric rings and pinkish spore masses in center of spots in wet weather.	Crop rotation and ziram or zineb sprays.
Bacterial wilt, a bacterium, *Xanthomonas solanacearum* Chiefly in Southeastern States.	Entire plant wilts without yellowing of leaves; water-soaked decay of stem.	Crop rotation. No resistant varieties.
Blossom-end rot, nonparasitic Widespread.	Large, dark, sunken, leathery spots at blossom end of fruits.	Avoid excessive use of nitrogenous fertilizers and use ample quantities of super-phosphate.
Curly top, a virus West of Continental Divide.	Seedlings yellow and die; leaves of larger plants are rolled upward and twisted; foliage stiff and leathery; stems abnormally erect; veins have purplish color.	No satisfactory control. Very close planting will reduce amount of disease.

HOST Disease and Cause Distribution	Symptoms	Control
TOMATO cont.		
Early blight, a fungus, *Alternaria solani* Widespread.	On leaves, many dark-brown spots that enlarge and show targetlike markings; cankers on stems girdle seedlings; fruits with large, dry, rotted spots at stem end.	Dust seed with 0.5 percent New Improved Ceresan; spray or dust with ziram or zineb, or spray with nabam (used with zinc sulfate).
Fusarium wilt, a fungus, *Fusarium oxysporum* f. *lycopersici* Widespread.	Gradual yellowing and wilting of foliage beginning with lower leaves; plants eventually die.	Resistant varieties; crop rotation.
Gray leaf spot, a fungus, *Stemphylium solani* Southeastern, Atlantic, and Central States.	Many small, dark brown spots that become grayish-brown and tear across; leaves yellow and drop.	Spray with copper fungicides, zineb or nabam (with zinc sulfate).
Late blight, a fungus, *Phytophthora infestans* In humid regions, particularly east of the Mississippi River.	Dark, water-soaked spots on leaves that turn brown and have white mildew on under sides in moist weather; large, dark decayed spots on fruits.	Spray with copper fungicides, zineb or nabam (used with zinc sulfate). Ziram and ferbam do not control late blight.
Mosaic, viruses Widespread.	Green and yellow mottling of leaves which often are curled, distorted, and dwarfed.	No very adequate control.
Septoria leaf spot, a fungus, *Septoria lycopersici* Atlantic and Central States as far south as South Carolina and Arkansas.	On leaves, many small, circular spots with gray centers covered with tiny dark specks.	Removal or turning under of diseased tomato vines in fall; crop rotation; spray or dust with copper fungicides, zineb, or nabam (with zinc sulfate).
Verticillium wilt, a fungus, *Verticillium albo-atrum* California, Utah, and some Northeastern States.	Yellowing, wilting, and loss of older leaves; plants wilt slightly during day but usually do not die.	Crop rotation; resistant varieties.
WATERMELON:		
Anthracnose, a fungus, *Colletotrichum lagenarium* East of Continental Divide.	Black spots on leaves that kill much of the foliage; circular, sunken spots on fruits with tan or pink masses of spores at center.	Seed treatment and sprays or dusts as recommended for cucumber anthracnose.

HOST Disease and Cause Distribution	Symptoms	Control
WATERMELON cont.		
Downy mildew, a fungus, *Pseudoperonospora cubensis*		
Chiefly along Atlantic seaboard.	Yellowish spots that later turn dark and may show purplish growth of fungus on under surface.	Spray or dust with copper fungicides or with ziram, zineb, or nabam (with zinc sulfate).
Fusarium wilt, a fungus, *Fusarium oxysporum* f. *niveum*		
Widespread.	Wilting and death of plants; fungus produces white, cottony growth on stems of dying vines.	Resistant varieties.
Stem-end rot, a fungus, *Diplodia natalensis*		
Chiefly in Southern States.	Soft, slimy decay of fruit whose surface becomes dark and shriveled; commonly starts at stem end.	Avoid injuring fruits in handling; after loading in car, cut stem and apply copper sulfate-starch paste to freshly cut surface.

DISEASES OF FORAGE LEGUMES

HOST Disease and Cause Distribution	Symptoms	Control
ALL FORAGE LEGUMES:		
Root knot nematode, *Meloidogyne* spp. General in South	Root swellings, stunting	Resistant varieties.
Southern blight, a fungus, *Sclerotium rolfsii* General in South	Decay at base of stem; formation of white mold and sclerotia on affected area	No control.
ALFALFA:		
Anthracnose, a fungus, *Colletotrichum trifolii* Eastern and Central States	Stem girdle and crown rot	Resistant varieties.
Bacterial wilt, a bacterium, *Corynebacterium insidiosum* Northern States, Southwest, California	Plants stunted and die	Resistant varieties.
Crown rot, a fungus, *Sclerotinia trifoliorum* General	Late-winter or early-spring wilt	Resistant varieties; rotation; deep plowing.
Damping-off, fungi: *Pythium* spp. General	Seedlings fail to emerge or break over and die	Seed treatment sometimes helpful; well-drained area.
Downy mildew, a fungus, *Peronospora trifoliorum* General	Leaves yellow and curl, purplish downy growth on under side	Resistant varieties.
Dwarf, a virus California and Arizona	Stunting, root discoloration, death	Resistant varieties
Leaf spot, a fungus, *Pseudopeziza medicaginis* General	Brown spots with raised disk in center	Clipping before serious; resistant varieties.
Root and crown rots, Fungi: *Fusarium* spp., *Rhizoctonia solani* General	Plants wilt and die	Rotation; good drainage.
Rust, a fungus, *Uromyces striatus medicaginis* General	Brown pustules	No control.
Spring black stem, a fungus, *Ascochyta imperfecta* Eastern and Central States	Leaf spot and stem blackening	Sanitation; clipping before serious.
Stem nematode, *Ditylenchus dipsaci* Western States	Dwarfing, shortened internodes, crown rot	Resistant varieties.
Summer black stem, a fungus, *Cercospora zebrina* General	Leaf spot, blackening of upper stems	No control.

HOST Disease and Cause Distribution	Symptoms	Control
ALFALFA cont.		
Target spot, a fungus, *Pleospora herbarum* (*Stemphylium botryosum*).		
Eastern States	Leaf spot with concentric rings.	No control.
Witches'-broom, a virus		
Washington, Utah, Arizona, Idaho, Oregon	Erect, bunchy growth	Community-wide plowing under of old diseased stand and reseeding.
Yellow leaf blotch, a fungus, *Pyrenopeziza medicaginis*		
General	Angular, yellow blotches between veins.	Clipping before serious.
CLOVERS:		
Crown rot. See under ALFALFA		
Damping-off, fungi: *Pythium* spp.		
General	Seedlings fail to emerge or break over and die.	Seed treatment sometimes helpful.
Leaf spot, a fungus, *Cercospora zebrina*		
General	Round to angular, reddish-brown spots.	Rotation; sanitation.
Mosaic, many viruses		
General	Mottling; yellow streaking or blotching; leaf distortion.	No control.
Root and crown rots. See under ALFALFA.		
Root rot, fungi: *Fusarium* spp., *Rhizoctonia solani*, *Phoma* sp.		
General	Plants wilt and die; roots discolored.	Rotation; adequate fertility.
Rust, fungi: *Uromyces trifolii hybridi* (alsike), *U. trifolii fallens* (red), *U. trifolii repentis* (white)		
General	Brown pustules on leaves and stems.	Resistant varieties.
Sooty blotch, a fungus, *Cymadothea trifolii*		
General	Elevated black patches on under side of leaves.	Clipping before severe.
Summer black stem. See Leaf spot.		
CLOVER, LADINO WHITE:		
Leaf spot, a fungus, *Curvularia trifolii*		
East, Pennsylvania to Florida	Leaf and petiole wilt.	Clipping before severe.
Pepper spot, a fungus, *Pseudoplea trifolii*		
General, eastern half of U. S.	Numerous, tiny, sunken black spots on leaves and petioles.	No control.

HOST Disease and Cause Distribution	Symptoms	Control
CLOVER, RED:		
Black patch, unidentified fungus		
Southeast and Wisconsin	Leaf spot and blight of heads.	Rotation; seed treatment.
Leaf spot, a fungus, *Pseudopeziza trifolii*		
General	Leaf spot with small, raised disk in center.	Resistant varieties.
Northern anthracnose, a fungus, *Kabatiella caulivora*		
General in northern clover belt.	Leaf scorch, stem killing.	Resistant varieties.
Powdery mildew, a fungus, *Erysiphe polygoni*		
General	White, powdery growth on leaf.	Resistant varieties.
Southern anthracnose, a fungus, *Colletotrichum trifolii*		
General in southern clover belt.	Leaf scorch, stem killing	Resistant varieties.
Spring black stem, a fungus, *Phoma trifolii*		
General	Leaf spot and stem discoloration.	Rotation, sanitation.
Target spot, a fungus, *Stemphylium sarcinaeforme*		
General	Leaf spot with concentric rings.	Resistant varieties.
COWPEA:		
Bacterial blight, a bacterium, *Xanthomonas vignicola*		
South	Stem blight.	Resistant varieties.
Root and crown rots. See under ALFALFA.		
KUDZU:		
Root rot, a fungus, *Rhizoctonia solani*		
South	Roots brown, plants killed.	No control.
LESPEDEZA:		
Bacterial wilt, a bacterium, *Xanthomonas lespedezae*.		
General where crop is grown.	Wilt of individual shoots.	Resistant varieties.
Powdery mildew, a fungus, *Microsphaera diffusa*		
General where crop is grown.	Powdery white growth on leaves.	Resistant varieties.
LUPINE:		
Anthracnose, a fungus, *Glomerella cingulata*		
Southeastern States	Girdling stem lesions	Rotation, disease-free seed.
Brown spot, a fungus, *Ceratophorum setosum*		
Southeastern States	Black spots on leaves and stems.	Rotation.

HOST Disease and Cause Distribution	Symptoms	Control
SOYBEAN:		
Bacterial blight, a bacterium, *Pseudomonas glycinea*		
General	Leaf lesions.	Resistant varieties.
Bacterial pustule, a bacterium, *Xanthomonas phaseoli*		
General	Leaf lesions.	Resistant varieties.
Brown stem rot, a fungus, *Cephalosporium gregatum*		
Midwest	Browning inside stems	Rotation.
Bud blight, a virus		
General, principally Midwest.	Leaf mottling, terminal and lateral bud blight.	No control.
Frogeye leaf spot, a fungus, *Cercospora sojina*		
General	Gray to tan leaf and pod spot.	Rotation; resistant varieties.
Mosaic, a virus		
General	Leaf mottling, terminal and lateral bud blight.	No control.
Purple seed stain, a fungus, *Cercospora kikuchii*		
General	Seed discolored pink to dark purple.	No control.
Stem canker, a fungus, *Diaporthe phaseolorum* var. *batatatis*.		
Midwest	Brown, sunken lesion girdles stem.	Rotation; sanitation.
Wildfire, a bacterium, *Pseudomonas tabaci*		
General.	Leaf lesions	Resistant varieties.
Yellow mosaic, a virus		
General, principally Midwest	Leaf mottling, terminal and lateral bud blight.	No control.
SWEETCLOVER:		
Black stem, a fungus, *Mycosphaerella lethalis*		
Eastern and Central U. S.	Leaf spot and stem blackening.	Clipping before serious; rotation.
Stem canker, a fungus, *Ascochyta caulicola*		
Central States	Silvery, white cankers on stems.	No control.
TREFOILS:		
Foliar blight, a fungus, *Rhizoctonia solani*		
General wherever grown	Leaves turn gray and wilt, stems killed.	No control.
VETCHES:		
Anthracnose, a fungus, *Colletotrichum villosum*		
General in South	Linear stem lesions.	Rotation; resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
VETCHES cont.		
Black stem, fungi: *Ascochyta pinodella*, *Mycosphaerella pinodes*		
General in South	Stem blackening.	Rotation; disease-free seed.
Leaf spot, a fungus, *Botrytis cinerea*		
General in South, occasionally elsewhere where crop is grown.	Small, dark-red spots on leaves.	Rotation; resistant varieties.
Root rot, a fungus, *Aphanomyces euteiches*		
General in South	Dwarfing, darkened roots	Resistant varieties.
WINTER PEA:		
Black stem. See under VETCHES.		
Leaf blotch, a fungus, *Septori pisi*		
General in South	Leaves yellow and turn brown.	Rotation
Root rot. See under VETCHES.		

DISEASES OF GRASSES

HOST Disease and Cause Distribution	Symptoms	Control
ALL GRASSES:		
Anthracnose, a fungus, *Colletotrichum graminicola*		
General	Light-tan lesions with dark specks on leaves and stems.	Adequate soil fertility; rotation; sanitation.
Bacterial streak, a bacterium, *Xanthomonas translucens*		
General	Translucent to yellowish streaks on leaves.	Resistant varieties.
Brown stripe, a fungus, *Scolecotrichum graminis*		
General	Brown to dark-purple streaks having gray centers with black dots in rows.	Resistant varieties.
Bunt. See Seed smuts.		
Crown rust, a fungus, *Puccinia coronata*		
General; most abundant in Mississippi Valley and Northeast.	Orange pustules, principally on leaves.	Resistant varieties and barberry eradication.
Downy mildew, fungi: *Sclerospora* spp.		
General	White, downy growth on leaves which turn yellow	Rotation; seed treatment.
Dwarf smut. See Seed smuts.		
Ergot, fungi: *Claviceps* spp.		
General	Black, sclerotial bodies replace seeds.	Ergot-free seed; deep plowing.
Eyespot, a fungus, *Mastigosporium rubricosum*		
Northwestern States	Gray spots with red or purple border.	No control.
Flag smuts. See Stripe smuts.		
Grass seed nematode, *Anguina* spp.		
Great Plains and West	Seeds transformed into purple or black galls.	Clean seed; burning; rotation.
Head smut, fungi: *Sorosporium*, *Sphacelotheca*, and *Ustilago* spp.		
General	Seed heads black and smutty.	Resistant varieties; sometimes seed treatment.
Leaf blotch, fungi: *Septoria* spp.		
General	Gray to brown spots along leaf blades.	Rotation; sanitation.
Leaf rusts, fungi: *Puccinia rubigo-vera agropyri*, *P. rubigo-vera apocrypta*, *P. rubigo-vera impatientis*, *P. rubigo-vera agropyrina*.		
General	Reddish-brown to orange pustules, principally on leaves.	Resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
ALL GRASSES cont.		
Leaf scald, a fungus, *Rhizoctonia solani*		
South	Large, bleached to tan areas on leaves.	Resistant varieties.
Loose smut. See Head smut.		
Pink snow mold, a fungus, *Fusarium nivale*		
Northern and western States	Leaves in winter formed into pink or straw-colored mats.	Select fields with good drainage.
Powdery mildew, a fungus, *Erysiphe graminis*		
General	White, dusty patches on leaves.	Resistant varieties.
Root rot, fungi: *Fusarium* spp., *Helminthosporium* spp., *Rhizoctonia solani*		
General	Plants stunted; roots discolored or rotted off.	Fall seeding where practical; good fertility.
Scald, fungi: *Rhynchosporium orthosporum*, *R. secalis*		
General	Grayish blotches on leaf blade and sheath.	Resistant varieties.
Seed smuts, fungi: *Tilletia* spp.		
General	Smut "balls" replacing seeds in heads.	Seed treatment; resistant varieties.
Seedling blight and root rot, fungi: *Pythium* spp.		
General	Seedlings damp-off, wilt suddenly, and die.	Well-drained soil; sometimes seed treatment.
Speckled snow mold, fungi: *Typhula* spp.		
Northern States	Gray rot of leaves in mid- to late-winter, tiny black sclerotia on dead leaves.	Chemical treatment on lawn or golf turfs.
Spot or blister smuts, fungi: *Entyloma* spp.		
General	Flat to slightly raised oval spots on leaves.	No control.
Stem rusts, fungi: *Puccinia graminis tritici*, *P. graminis avenae*, *P. graminis secalis*, *P. graminis poae*, *P. graminis phlei-pratensis*		
General	Reddish-brown to black pustules, chiefly on stems.	Resistant varieties and eradication of barberry.
Stem smuts, fungi: *Ustilago* spp.		
General, but principally west of Mississippi River.	Brown to black smutty areas on internodes of stems.	Resistant varieties.
Stripe rust, a fungus, *Puccinia glumarum*		
Rocky Mountain States and westward.	Yellow pustules in rows or stripes.	Resistant varieties.
Stripe smuts, fungi: *Ustilago* and *Urocystis* spp.		
General	Gray to black stripes of varying length on leaves causing curling and shredding.	Seed treatment; resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
BERMUDA-GRASS:		
Leaf spot, fungi: *Helminthosporium giganteum*, *H. cynodontis*		
South	Zonate eyespot; bleaching and withering of leaf tips.	No control.
BLUEGRASSES:		
Leaf rust, a fungus, *Puccinia poae-sudeticae*		
General	Orange-red pustules on leaves and occasionally stems.	Resistant varieties.
BROMEGRASSES:		
Brown spot, a fungus, *Helminthosporium bromi*		
Northern half of U. S.	Dark-brown to purple spots surrounded by yellow border.	Resistant varieties.
Chocolate leaf spot or bacterial blight, a bacterium, *Pseudomonas coronafaciens* var. *atropurpurea*		
General	Grayish to purple-brown streaks on leaves.	Resistant varieties.
Leaf spot, a fungus, *Selenophoma bromigena*		
Central and Western States	Circular to irregular gray spots with brown borders.	Rotation; resistant varieties.
BUFFALOGRASS:		
Leaf and glume spot, false smut, a fungus, *Cercospora seminalis*		
Great Plains and West	Olive-green smutty growth on seed spikelets.	No control.
FOXTAIL MILLET:		
Gray leaf spot, a fungus, *Piricularia grisea*		
Central, Eastern, and Southern States.	Small, gray, circular to oval spots on leaves.	No control.
ORCHARDGRASS:		
Leaf spot, a fungus, *Stagonospora maculata*		
Northeastern States	Small, elongate, dark-brown to purple spots.	Resistant varieties.
PERENNIAL RYEGRASS:		
Blind seed disease, a fungus, *Phialea temulenta*		
Oregon and Washington	Normal-appearing seeds fail to germinate.	Burning; disease-free seed; deep plowing.
REDTOP:		
Red leaf spot, a fungus, *Helminthosporium erythrospilum*		
General	Straw-colored spots with reddish or brownish border.	No control.
SUDANGRASS, JOHNSONGRASS, SORGHUMS:		
Bacterial streak, a bacterium, *Xanthomonas holcicola*		
General	Narrow, red to brown irregular streaks.	Resistant varieties.

HOST Disease and Cause Distribution	Symptoms	Control
Bacterial stripe, a bacterium, *Pseudomonas andropogoni*		
General	Long, purplish-red to brown or tan stripes on leaves.	Resistant varieties.
Leaf blight, a fungus, *Helminthosporium turcicum*		
General	Large, gray to straw-colored lesions.	Resistant varieties.
Zonate leaf spot, a fungus, *Gloeocercospora sorghi*		
South	Large, reddish-purple to tan zonate spots.	Resistant varieties.
TALL FESCUE:		
Net blotch, a fungus, *Helminthosporium dictyoides*		
General	Dark-brown, netlike leaf discoloration.	Resistant varieties.
TIMOTHY:		
Eyespot, a fungus, *Heterosporium phlei*		
General	Small, oval, light-colored spots with narrow, violet or brown border.	Resistant varieties.

DISEASES OF FRUIT CROPS

HOST Disease and Cause Distribution	Symptoms	Control
APPLE:		
Armillaria root rot, a fungus, *Armillaria mellea* General	Kills portion or entire tree, leaves collapse.	Difficult; avoid planting in newly cleared land.
Bitter pit, nonparasitic Throughout world	Small sunken spots, generally on lower half of apple.	Difficult; avoid excessive irrigation and nitrogen fertilization.
Bitter rot, a fungus, *Glomerella cingulata* Common in Southern States east of Rocky Mountains	Rapid, destructive rot of fruit; diseased portion covered with concentric rings of sticky spore masses.	Bordeaux mixture or ferbam sprays starting in June.
Black rot, a fungus, *Physalospora obtusa* General	Leaf spot causing excessive defoliation; affected fruit holds shape and has rings of color but no spores on surface.	Removal of all deadwood. Sprays for apple scab will hold disease in check.
Blotch, a fungus, *Phyllosticta solitaria* General in southern portion of apple region east of Continental Divide	Blotchy spots on fruit; cankers on twigs; at times a tiny spot on leaves.	Bordeaux mixture or ferbam sprays.
Brown rot, a fungus, *Monilinia fructicola* Occurs only occasionally in humid sections	Fruit rot; circular rings of gray spores.	Sulfur spray or dust.
Crown gall, a bacterium, *Agrobacterium tumefaciens* General, particularly on nursery stock	Rough galls on stem and roots.	Difficult once established in orchard; avoid planting diseased nursery stock.
Fire blight, a bacterium, *Erwinia amylovora* General	Kills twigs, leaves, and sometimes entire tree.	Difficult; avoid overfertilization; cut out all dead twigs and branches. Weak bordeaux spray during blossom period is sometimes beneficial.
Jonathan spot, nonparasitic General	Small, brown, roughly circular spots. Mainly on Jonathan variety but similar spots occur on many others.	Prompt cold storage after picking. Disease is primarily a transit and storage problem.
Mosaic, a virus Scattered throughout the world	Yellowish to white irregular areas on leaf; sometimes veins are chlorotic (white) while rest of leaf has normal green color.	Do not propagate from diseased trees; plant only clean stock.

HOST Disease and Cause Distribution	Symptoms	Control
APPLE cont.		
Northwestern anthracnose and perennial canker, fungi: *Neofabraea malicorticis* and *N. perennans*		
Pacific Northwest	Cankers on trees and bull's-eye type of fruit rot.	Control of woolly aphid reduces cankers on trees. Sprays during summer and washing harvested fruit reduce storage losses.
Phytophthora rot, a fungus, *Phytophthora cactorum*		
Scattered but more prevalent in Far West	Light-brown rot of fruit and cankers on trunk of tree.	Losses in market can be prevented by not selling fallen fruit. Trunk canker difficult to control.
Pink rot, a fungus, *Cephalothecium roseum*		
Common storage problem	Commonly associated with scab lesions; rotted spots remain firm and dry.	Storage below 50° F.
Powdery mildew, a fungus, *Podosphaera leucotricha*		
Common on nursery stock but mainly important in West on bearing trees	Leaves and shoots covered with grayish or white felt-like patches of mycelium; fruit reduced in size and skin russeted.	Liquid lime-sulfur or finely divided sulfur sprays during early part of growing season.
Rust, fungi: *Gymnosporangium juniperi-virginianae*, *G. globosum*, and *G. clavipes*		
Widespread	Galls on cedar leaves (cedar-apples); orange spots on leaves, clusters of cuplike structures on lower leaf surface; similar structures on fruit; symptoms vary with fungus involved.	Removal of cedar trees; if possible; ferbam sprays (1 - 1 1/2 lbs.) at pink, petal fall, and 10 days later for apple trees.
Scald, nonparasitic		
Widely distributed	A storage and transit problem. Skin of fruit is affected and area beneath is brown for 1/4 inch or more.	Prompt storage; oiled wrappers or shredded oiled paper in containers for fruit.
Sooty blotch, a fungus, *Gloeodes pomigena*		
Widespread	Irregular sooty patches or spots on fruit.	Bordeaux mixture or ferbam sprays.
Scab, a fungus, *Venturia inaequalis*		
Everywhere apples are grown except in very dry regions	Brown velvetlike spots on leaves, blossoms, fruit, and at times twigs; spots may cause misshapen fruit.	Regular spray schedule using sulfur during early part of growing season.
Spongy dry rot, a fungus, *Colletotrichum fructus*		
Observed in North Carolina, Massachusetts, New York, West Virginia, Pennsylvania, and Indiana.	Small black spots scattered over surface of apple, usually on fallen fruit.	No special procedures have been developed. Regular spray schedule should hold losses to a minimum.

HOST Disease and Cause Distribution	Symptoms	Control
APPLE cont.		
Water core, nonparasitic		
General; especially prevalent in dry areas.	Flesh becomes water-soaked and frequently is hard and glossy; sometimes only core region is affected.	Prompt picking of fruit; especially exposed fruit on southwest side of tree.
APRICOT:		
Black spot, a bacterium, *Xanthomonas pruni*		
Common east of Rocky Mountains.	Spots on leaves, shot-hole effect; rough spots on fruit; cankers on twigs.	Difficult; no very satisfactory control known.
Brown rot, a fungus, *Monilinia laxa*		
General along Pacific coast	Blighting of blossoms and rot of fruit.	Copper spray before buds open in spring.
Coryneum fruit spot, a fungus, *Coryneum carpophilum*		
Common west of Rocky Mountains.	Spots on leaves; reddish spots with dark centers on on fruit.	Bordeaux mixture spray in fall and following spring.
Rust, fungi: *Tranzschelia pruni-spinosae* and *T. discolor*		
General, especially in Pacific Coast States.	Yellow spots on upper surface of leaves, reddish-brown, dusty pustules on lower surface; severe defoliation frequent.	No satisfactory control measure because of extreme sensitivity of apricot to sulfur sprays.
Scab, a fungus, *Cladosporium carpophilum*		
General	Black spots on fruit and pale-gray blotches on twigs.	Not important enough to require special treatment.
Silver leaf, a fungus, *Stereum purpureum*		
Scattered	Peculiar ashen-gray color of leaves; no fruit produced.	No satisfactory method known; avoid injuries to trees.
Yellows, a virus		
Scattered	Short willowlike shoots with small pale leaves.	Removal and destruction of affected trees.
AVOCADO:		
Anthracnose, a fungus, *Colletotrichum gloeosporioides*		
Florida and California	Black spots on fruit.	Bordeaux mixture sprays.
Blotch, a fungus, *Cercospora purpurea*		
Florida	Small, brown, slightly sunken spots on fruit; small angular spots on leaves.	Bordeaux mixture, cuprous oxide, or basic copper sulfate spray.
Cankers, fungi: *Phytophthora cactorum* and *P. cinnamomi*		
California and Florida	Cankers on trunk and rootstock.	High budding of susceptible varieties; pruning of diseased tissue and painting with bordeaux paste.

HOST Disease and Cause Distribution	Symptoms	Control
AVOCADO cont.		
Deficiency, nonparasitic Scattered in California and Florida.	Zinc deficiency causes little-leaf condition; lack of iron causes yellowing of leaf; excess of chlorides may cause tipburn of leaves.	Supplying, in a spray, small quantities of element missing. Difficult to control injury from excess of chlorides.
Dothiorella rot, a fungus, *Botryosphaeria ribis* (Imperfect stage, *Dothiorella gregaria*) California and Florida	Small brown or purplish-brown spots appear on ripe fruit after it has been harvested.	Removal of dead twigs and leaves; bordeaux mixture or certain organic sprays (Crag fungicide 658, and zineb); picking before fruit reaches peak of maturity.
Powdery mildew, a fungus, *Oidium* sp. Occasionally in Florida	White powdery spots on lower surface of leaf; tender tips of shoots are killed back.	Lime-sulfur spray or sulfur dust.
Root rot, a fungus, *Phytophthora cinnamomi* Widespread in tropics	Trees gradually deteriorate, become less green, branches die back; roots are blackened and brittle; tree dies.	No adequate control measures known. Avoid planting on poorly drained soils.
Scab, a fungus, *Sphaceloma perseae* Florida	Raised, corky brown spots on fruit; similar spots on leaves and twigs.	Bordeaux mixture or cuprous oxide sprays.
Sun blotch, a virus California and rarely in Florida.	Yellow to red streaks on mature fruit; yellow streaks on green stems and branches.	Disease-free wood for propagation; removal of all trees showing symptoms.
Verticillium rot, a fungus, *Verticillium albo-atrum* California and Florida	Sudden wilting and collapse of trees.	Avoid planting on infected land; do not interplant with susceptible crops; do not use affected trees as source of budwood.
BANANA:		
Bacterial wilt, a bacterium, *Xanthomonas solanacearum* General	Leaves turn yellow or white; individual "fingers" may be dwarfed or turn black.	Removal of all banana trash and deep plowing to expose ground to sun.
Bunchy top, a virus General except in Caribbean region and West Africa.	New leaves short; with up-curved margins; leaves stiff and upright; fruit rarely produced.	Roguing of diseased plants.

HOST Disease and Cause Distribution	Symptoms	Control
BANANA cont.		
Cigar-end disease, a fungus, *Stachylidium theobromae*		
General.	Tip of bananas shrinks and turns gray to black.	Very few fruit usually involved; no special measures.
Elephantiasis, not definitely established -- several fungi and bacteria reported to be involved		
Occurs on newly planted land; in Western Hemisphere.	Bottom or top of rhizome enlarges, separating leaves.	Same as for bacterial wilt.
Finger, neck, and stalk rots, fungi: *Thielaviopsis paradoxa* and *Gloeosporium musarum*		
Western Hemisphere	Fruit stem invaded; fruit discolored and rotted.	Cover cut surface of stalk with fungicide paste; clean and treat all machinery that handles fruit.
Heart leaf disease, not definitely established		
Frequent in new plantings	Heart leaf fails to unroll, wilts, and develops rotted patches.	Plant recovers in well-fertilized plantings.
Panama disease, a fungus, *Fusarium oxysporum cubense*		
Widespread in Tropics	Leaves wither and drop; entire plant killed. Pseudostem splits; vascular bundles discolored.	Difficult; flood land with 3 feet of water for 6 months.
Sigatoka disease, a fungus, *Mycosphaerella musicola*		
Worldwide in Tropics	Streaks and black, elliptical spots on leaves. Appears first on fourth or fifth leaf.	10-10-100 bordeaux mixture spray at 7- to 14-day intervals.
Squirter, a fungus, *Nigrospora sphaerica*		
Common in Australia; occasionally in Caribbean region.	Fruit rots with pulp decomposed into dark thick fluid.	Fungicidal dip for fruit.
BLACKBERRY:		
Anthracnose, a fungus, *Elsinoë veneta*		
General	Spots with gray centers and purple-brown margins on canes; fruit and leaves rarely attacked.	Pruning of diseased canes; bordeaux mixture spray.
Cane rust, a fungus, *Kuehneola uredinis*		
General	Canes split and dry out; leaves attacked in late summer. Does not prevent blossoming.	Fungus does not infect roots; plants do not have to be dug up and destroyed; merely remove and burn diseased canes.
Crown gall, a bacterium, *Agrobacterium tumefaciens*		
General	Galls develop at base of canes as well as some distance above ground.	Plant only disease-free nursery stock; dig and destroy badly infected plants.

HOST Disease and Cause	Symptoms	Control
BLACKBERRY cont.		
Double blossom, a fungus, *Cercosporella rubi*		
General in Southern States	Witches'-brooms form on stems. Flower buds larger petals wrinkled and twisted.	Only control is removal and destruction of double blossoms.
Leaf blight, a fungus, *Mycosphaerella dubia*		
Scattered locations in South	Leaves are spotted; turn brown as though scorched.	Spray for anthracnose will control leaf blight.
Leaf spot, a fungus, *Mycosphaerella rubi*		
General	Spots on leaves with purple margins and gray centers.	Spray for anthracnose will control.
Orange rust, a fungus, *Gymnoconia interstitialis*		
General	In early spring leaves are covered with orange, blister-like pustules filled with spores. Prevents blossoming.	Removal of all rust-infected plants; regular inspection of plantings to detect disease.
BLUEBERRY:		
Botrytis blight, a fungus, *Botrytis cinerea*		
Widespread	Blossom clusters blighted, tip of shoots infected, fruit rots.	No satisfactory control known.
Leaf spot (double spot), a fungus, *Dothichiza caroliniana*		
Common in Southeastern States.	Spots on leaves.	Bordeaux mixture spray.
Mummy berry, a fungus, *Monilinia urnula*		
Widespread	Young leaves and flower buds affected. Fruit changed into hard inedible mummies.	Ziram spray in spring to protect young buds.
Powdery mildew, a fungus, *Microsphaera pedicillata*		
Widespread in Eastern States.	Leaves covered with web of fungus growth and killed.	Wettable sulfur or bordeaux mixture sprays.
Rust (leaf), a fungus, *Pucciniastrum myrtilli*		
Common in range of alternate host (hemlock).	Small irregular dark-brown spots with dusty pustules.	Copper-lime dusts.
Stem canker, a fungus, *Physalospora corticis*		
General in Southeastern States	Cankers on bark of stems and branches.	Difficult to control; resistant varieties only logical solution.
Stunt, a virus		
Eastern States	Dwarfs bush; small leaves, abnormally colored; fruit small, poor quality.	Removal of diseased plants; DDT to control leafhopper that spreads disease.
Tip blight, a fungus, *Diaporthe vaccinii*		
In Eastern States and Washington.	Tips of twig infected and die.	None developed.

HOST Disease and Cause	Symptoms	Control
BLUEBERRY cont.		
Witches'-broom, a fungus, *Pucciniastrum goeppertianum* Widespread	Whorls of short swollen branches develop.	None known; infected portions should be removed.
CHERRY:		
Black knot, a fungus, *Dibotryon morbosum* General	Hard, black, rough fungus growths develop on shoots, branches, and sometimes trunk.	Pruning of diseased areas; bordeaux mixture spray in dormant season; removal of affected wild trees near orchard.
Brown rot, a fungus, *Monilinia fructicola* General	Blossoms sometimes blighted but disease commonly rots fruit as it begins to ripen.	Usually controlled by sprays for leaf spot. Application of sulfur just as fruit begins to color very helpful.
Leaf spot, a fungus, *Coccomyces hiemalis* General	Brown spots develop on leaves; tree can be defoliated rapidly.	Spray sour cherries with lime-sulfur or copper compounds. Never use copper sprays on sweet cherries.
Powdery mildew, a fungus, *Podosphaera oxyacanthae* General	Small, round, whitish blotches on leaves and shoots; affected part covered by feltlike fungus growth.	Sprays for leaf spot generally keep disease under control.
Yellows, a virus Northeastern States	Green and yellow mottling of leaves followed by waves of defoliation 3-4 weeks after petal fall.	Certified virus-free nursery stock.
CITRUS:		
Deficiency diseases, nonparasitic Severe in some sections	Vary with particular element that is deficient.	Addition of required element either as spray or in fertilizer.
Gummosis, nonparasitic General	Gum pockets under bark; large areas sometimes involved.	Keep trees in vigorous growing condition.
Melanose, a fungus, *Diaporthe citri* Common in Florida, rare in California	Raised, rough, brown spots develop on fruit, leaves, and twigs.	Bordeaux mixture spray.

HOST Disease and Cause	Symptoms	Control
CITRUS cont.		
Psorosis, a virus		
General in California and Florida.	Small areas of bark and branches die; bark cracks; affected trees slowly go out of production.	Select budwood only from psorosis-free trees.
Scab, a fungus, *Elsinoë fawcetti*		
General	Irregular warty outgrowths that have light-brown or grayish tips.	Bordeaux mixture spray.
Stem-end rot, fungi: *Phomopsis citri*, *Diplodia natalensis*		
General	Fruit decay starting at stem end and gradually involving entire fruit. A storage and market disease.	Prompt cooling and marketing of fruit.
Tristeza and quick decline, a virus		
In most citrus sections throughout world.	Food-conducting tissues of stem collapse; stem pitting develops; trees rapidly decline and die.	Disease-tolerant rootstocks and disease-free buds to produce new trees.
CRANBERRY:		
False-blossom, a virus		
Wisconsin, Massachusetts and New Jersey.	Erect flowers with short petals and enlarged greenish calyx lobes; no fruit produced.	Production of resistant varieties.
Fruit rots, eight species of fungi		
General	Berries rot on vines and in storage.	Ferbam spray at beginning and end of blossom period.
Oxygen deficiency, physiological lack of oxygen caused by flooding bogs		
General	All parts of plant may be injured or killed.	Control flooding of bogs; do not allow water to get too deep; keep oxygen content of water above 5.7 p.p.m.
FIG:		
Anthracnose, a fungus, *Glomerella cingulata*		
General	Sunken discolored spots on fruit, frequently covered with pink spore masses; gray sunken spots on leaves.	No special procedure has been developed; remove and destroy infected fruit.
Leaf blight, a fungus, *Corticium* sp.		
General	Yellow water-soaked areas on leaves, finally silvery white on upper surface, web of fungus growth on lower surface. Also affects twigs and fruit.	Destroy all affected leaves, twigs, and fruit.

HOST Disease and Cause	Symptoms	Control
FIG cont.		
Root rot, a fungus, *Phymatotrichum omnivorum* Localized areas in Southwest.	Leaves wilt and bush dies within a few days; roots are decayed.	None; fig should not be planted in areas where fungus is known to occur.
Rust, a fungus, *Physopella fici* General	Light-colored pustles with powdery spore masses form on under side of leaf.	Bordeaux mixture sprays starting in June at intervals of 3-4 weeks until end of growing season.
GRAPE:		
Anthracnose, a fungus, *Elsinoë ampelina* Eastern States especially in the South.	Dark-brown, small spots on leaves; spots on fruit have dark center (bird's-eye rot).	Removal of all diseased parts of vine; lime-sulfur and then bordeaux mixture sprays.
Black rot, a fungus, *Guignardia bidwellii* General east of Rocky Mountains.	Circular spots on leaves, petioles, shoots, blossoms; fruit rapidly destroyed, shrivels into mummies.	Bordeaux mixture or ferbam spray.
Dead arm, a fungus, *Cryptosporella viticola* General in Northeastern States.	Canker on branch (arm) or trunk; leaves yellow, small, crimped; affected portion dies; fruit sometimes affected.	Systematic removal of all diseased parts followed by spraying with bordeaux mixture or ferbam.
Downy mildew, a fungus, *Plasmopara viticola* Common in Eastern States.	Light-yellow, roughly circular spots on leaves; downy fungus growth on lower surface of leaves; fruit may be covered with fungus growth.	Bordeaux mixture of fixed coppers plus lime.
Powdery mildew, a fungus, *Uncinula necator* General; particularly destructive in Pacific Coast States.	Superficial, grayish-white fungus growth on leaves, shoots, and fruit; fungus grows on upper surface of leaves.	Copper fungicides in East; sulfur spray or dusts in West.
PEACH:		
Armillaria root rot, a fungus, *Armillaria mellea* General	Tree goes into slow decline and dies; roots rotted.	No very satisfactory method developed.
Bacterial spot, a bacterium, *Xanthomonas pruni* General east of Rocky Mountains.	Small, purple, angular spots on leaves; rough cracks on fruit.	Difficult; spraying with zinc-lime holds disease in check.

HOST Disease and Cause	Symptoms	Control
PEACH cont.		
Brown rot, a fungus, *Monilinia fructicola* General	Blights blossoms; cankers on twigs; fruit rots rapidly, covered with gray spore masses.	Sulfur spray or dust; control of plum curculio.
Clitocybe root rot, a fungus, *Clitocybe tabescens* Scattered, especially in Southeast.	Affected trees slowly lose vigor; roots destroyed.	No control measures developed.
Cold injury, low temperatures General	Buds may be killed in spring; branches, limbs, and even entire trees may be killed during winter.	Keep trees growing vigorously, control diseases, prevent defoliation.
Constriction disease, a fungus, *Diaporthe* sp. Eastern seaboard	Cankers form at base of buds; twigs girdled and killed.	No satisfactory procedure known.
Coryneum blight, a fungus, *Coryneum carpophilum* General along Pacific coast; occasionally noted in East.	Gumming cankers on twigs, spots on leaves; small spots with white centers on fruit.	Bordeaux mixture spray during winter.
Crown gall, a bacterium, *Agrobacterium tumefaciens* General	Galls on roots and crown. Important in nursery stock.	Disease-free planting stock.
Dieback, a fungus, *Valsa leucostoma* General	Fungus occurs on woody parts of tree as result of other injuries.	Keep trees growing vigorously; prune carefully to avoid sunscald.
Leaf curl, a fungus, *Taphrina deformans* General	Unfolding leaves distorted in spring; young shoots may be swollen; red welts on fruit.	Readily controlled by spray of lime-sulfur or bordeaux mixture in dormant season.
Little peach, a virus Northeastern States	Fruit ripens later than normal, leaves light green, rolled, and drooped.	Trees never recover and should be removed.
Phony, a virus Widespread in Southeast.	Trees stunted; leaves frequently dark green; fruit insipid, small.	Only control available is removal of diseased trees.
Rosette, a virus Scattered in South.	Twigs shortened producing whorls or rosettes; tree killed.	Immediate removal of diseased trees.

HOST Disease and Cause	Symptoms	Control
PEACH cont.		
Rust, a fungus, *Tranzschelia discolor* General	Yellow spots on leaves, dusty brown pustules of spores on lower surface; fruit attacked in California.	Controlled in West by sulfur sprays.
Scab, a fungus, *Cladosporium carpophilum* General	Brown to black spots on fruit, frequently around stem; in severe cases fruit is cracked; numerous spots on twigs.	Sulfur spray 4 to 5 weeks after petals drop.
Yellows, a virus Eastern and Central States; rare south of Virginia.	Premature ripening of fruit, red spots on fruit; willowlike shoots with small pale leaves.	Affected trees never recover; remove immediately.
PEAR:		
Fire blight, a bacterium, *Erwinia amylovora* General	Kills blossom clusters, twigs, limbs, and even entire trees.	Difficult; remove all blighted shoots, do not overfertilize.
Leaf blight, a fungus, *Fabraea maculata* General	Carmine-red spots on leaves that turn dark brown; similar spots on fruit.	Ferbam, lime-sulfur or bordeaux mixture sprays. Ferbam causes the least injury to leaves.
Leaf spot, a fungus, *Mycosphaerella sentina* General in Eastern States.	Only leaves are affected; spots have well-defined, angular margins and grayish-white centers.	Sprays recommended for leaf blight will also control this disease.
Scab, a fungus, *Venturia pyrina* General	Olive-colored spots on fruit, leaves, and twigs; skin of fruit cracks; fruit frequently distorted.	Bordeaux mixture or sulfur spray. Ferbam and ziram now used by commercial growers in West.
Stony pit, a virus Prevalent in Northwest; scattered cases in East.	Fruit develops sunken spots and becomes much distorted; flesh at base of pit hard. Particularly common on Bosc variety.	No control known; Bosc trees frequently top-worked to Bartlett which does not show symptoms.
PECAN:		
Bunch disease, a virus Mississippi, Texas, Oklahoma, and Louisiana.	Broomlike groups of small branches and shoots.	No method known; do not propagate from diseased trees.

HOST Disease and Cause	Symptoms	Control
PECAN cont.		
Crown gall, a bacterium, *Agrobacterium tumefaciens*		
General	Rough swellings on roots and at base of trunk; nursery trees frequently affected.	Avoid planting diseased nursery stock.
Leaf diseases, various fungi		
Throughout Southern States.	Spots of various types on leaves; some defoliation.	Do not plant trees too closely; keep trees growing vigorously. Scab sprays will control these troubles.
Scab, a fungus, *Cladosporium effusum*		
Throughout Southern States.	Premature defoliation; nuts shrivel and are destroyed.	Removal of old diseased leaves and nuts in early spring; pruning; low lime bordeaux mixture spray followed by sprays of ziram or zineb.
Rosette, nutritional (lack of zinc)		
Throughout Southern States.	Yellow mottling and crinkling of leaves; dwarf leaves; twigs and branches in top of tree die.	Zinc sulfate spray, 2 lbs. to 100 gallons (number of applications depends upon severity of disease). Zinc sulfate applied to soil also beneficial.
PLUM:		
Black knot, a fungus, *Dibotryon morbosum*		
General	Galls or knots on twigs and branches.	Removal of diseased parts; bordeaux mixture spray during winter.
Black spot, a bacterium, *Xanthomonas pruni*		
General east of Rocky Mountains.	Purple spots on leaves; dark roughened spots on fruit; large cankers on twigs and branches.	Difficult; do not plant Japanese varieties in areas where disease occurs.
Brown rot, a fungus, *Monilinia fructicola*		
General	See under Peach	See under Peach.
Plum pockets, a fungus, *Taphrina* sp.		
General	Fruit enlarged, hollow, and spongy; no seed; young leaves and shoots swollen and distorted.	Lime-sulfur or bordeaux mixture spray during dormant period.
Rosette, a virus		
In South	See under Peach	Destruction of all affected trees.
Rust, a fungus, *Tranzschelia pruni-spinosae* and *T. discolor*		
General	Yellow spots on leaves and pustules of brown spores on lower surface of leaves.	Definite control procedures not developed.

HOST Disease and Cause	Symptoms	Control
PLUM cont.		
Yellows, a virus Scattered in northern half of country east of Rocky Mountains.	See under Peach.	Removal and destruction of all affected trees.
QUINCE:		
Fire blight, a bacterium, *Erwinia amylovora* General	Killing of young shoots, leaves, and blossom clusters.	Difficult; no satisfactory method known.
Fruit spot, a fungus, *Mycosphaerella pomi* General in Eastern States.	Dark blotchlike spots form, usually more numerous around blossom end.	Ferbam spray in late June and again in July.
Leaf blight, a fungus, *Fabraea maculata* General	Roughly circular spots on leaves and black spots on fruit.	Ferbam spray several times during growing season.
Rust, a fungus, *Gymnosporangium clavipes* Common in Eastern States.	Orange fringelike growths develop on fruit and frequently on twigs.	Removal of cedar trees; ferbam spray on quince in spring.
RASPBERRY:		
Anthracnose, a fungus, *Elsinoë veneta* General	Circular, red-brown, sunken spots on canes; light-colored spots on leaves; fruit infected, misshapen, and worthless.	Removal and destruction of affected canes; lime-sulfur or dinitro spray in dormant season; ferbam during growing season.
Blue stem, a fungus, *Verticillium albo-atrum* General	Lower leaves turn yellow and die; entire plant wilts and canes turn blue.	Use only healthy plants; do not interplant with tomatoes or potatoes; remove infected plants; drench soil with fungicide.
Leaf spot, a fungus, *Septoria rubi* General in Eastern States.	Brown or purple spots on leaves; severe defoliation.	Destruction of affected leaves; sprays as given for anthracnose.
Mild streak, a virus General	Only on black varieties. Canes have discolored stripes; plants rarely killed.	Keep new plantings isolated, use only disease-free stock; destroy diseased plants.
Mosaic, a virus General	Green type: Mottled pattern of light and dark green areas on leaves. Yellow type: Entire leaf turns bright yellow.	Destroy infected plants; use only disease-free planting stock; control aphids.

HOST Disease and Cause	Symptoms	Control
RASPBERRY cont.		
Orange rust, a fungus, *Gymnoconia interstitialis*		
General	Leaves covered with bright orange mass of powdery spores.	Remove and burn infected plants; destroy nearby wild plants.
Severe streak, a virus		
General	Similar to mild-streak except symptoms more severe and plants soon die.	Same as for mild streak.
Spur blight, a fungus, *Didymella applanata*		
General in Eastern States.	Reddish-brown areas on stem around buds; canes sometimes killed.	Remove old canes; keep plants open for air circulation; use lime-sulfur in winter and ferbam for summer sprays.
STRAWBERRY:		
Botrytis rot, a fungus, *Botrytis* sp.		
General	All parts above ground affected but fruit severely damaged; small brown spots develop and berry is soon rotted.	No satisfactory control procedure; do not allow affected fruit to be mixed with sound berries.
Crinkle, a virus		
Mainly in Pacific Northwest.	Crinkling or wrinkling of leaves; leaves flecked with yellow.	Development of virus-free plants.
Leaf spot, a fungus, *Mycosphaerella fragariae*		
General	Small purple or red spots form on leaves; spots may fuse and leaves turn brown and die.	Difficult; spraying with bordeaux mixture gives some control.
Powdery mildew, a fungus, *Sphaerotheca humuli*		
General	Leaves curl and are covered with powdery, white fungus growth; affected fruit dries and does not mature.	Difficult; probably spraying with sulfur will control.
Red stele, a fungus, *Phytophthora fragariae*		
General	Central portion (vascular cylinder) of roots has red color; small roots killed; plants stunted; leaves wilt.	Development of disease-resistant varieties only control known.
Stunt, a virus		
General	Leaf petioles shorter than normal, remain upright; no yellowing of leaf surface.	Development of virus-free plants.
Yellows, a virus		
General	Leaves cupped upward, yellow edges; plants stunted.	Development of virus-free plants.